DOCUMENT RESUME

ED 128 622 CE 007 942

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TITLE Mechanical Drafting. Trade and Industrial Education Course of Study.
INSTITUTION Pennsylvania State Dept. of Education, Harrisburg. Bureau of Vocational Education.; Pennsylvania State Univ., University Park. Dept. of Vocational Education.
PUB DATE 75
NOTE 219p.

EDRS PRICE MF-$0.83 HC-$11.37 Plus Postage.
DESCRIPTORS Curriculum; *Curriculum Guides; *Drafting; *Engineering Drawing; *Learning Activities; Secondary Education; *Skill Development; *Teaching Guides; Technical Education; Trade and Industrial Education; Vocational Education

ABSTRACT

This teaching and learning guide is designed for students who seek specialized training in mechanical drafting. Contents are organized as follows: (1) Introductory section giving the course philosophy, general course objectives, instructional plan, and bibliography, (2) course outline (which includes the 12 units of the graphic language; use and care of instruments; lettering; geometric construction; multiview projection; freehand sketching; reproduction and control of drawings; sectional views; auxiliary views; revolutions; and axonometric and oblique), and (3) written instructional aids consisting of job sheets, operation sheets, and sample information and assignment sheets. Over 100 suggested jobs are listed to provide experiences for the student in developing skill competencies. For each job, a corresponding job sheet tells the student what to do in performing the job. Information on the job sheet includes the material and tools needed, specific procedures or steps, related teaching/learning activities, and method of evaluation. Operation sheets supplement the job sheets and indicate how to perform the operations necessary to complete the assigned job. The information sheets and assignment sheets needed to supplement the job sheets are to be prepared by the instructor following the samples provided. (Author/RG)

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ED128622

TRADE AND INDUSTRIAL EDUCATION

COURSE OF STUDY

FOR

MECHANICAL DRAFTING

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IN COOPERATION WITH

Department of Vocational Education
College of Education
The Pennsylvania State University

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Department of Education
Bureau of Vocational Education
Harrisburg, Pennsylvania

1975

CE 007 942

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PREFACE

In recent years, we have planned and constructed the finest of vocational education facilities and have placed fine equipment in these facilities. Equal attention must be directed to provide the teacher with the basic tools for instruction to assist in providing quality instruction.

This basic course of study is intended to be used as a teaching and learning guide. The information provides the basic skills of the occupation, so that the students who successfully complete the course will have sufficient competencies for initial employment and ample orientation for growth and advancement. The teacher who uses this course may find it necessary to modify and supplement the material to meet the needs of specific students and the local industrial community.

Robert Jacoby

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1975

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COURSE PHILOSOPHY

This course of study for the training of mechanical draftsmen meets the needs of secondary school students who seek specialized training in order to enter the labor market. Opportunities will be provided to encourage development of skill, knowledge and attitudes necessary for the student to function on the job, as well as enhance his citizenship qualities.

It is planned that each student may progress at a rate most appropriate for his background, desires and abilities. Those students showing leadership qualities will have the opportunity to exercise and develop those qualities. Group projects will be designed to encourage worker cooperation and provide leadership functions. Safety on the job and safety in the design of products will be a regular consideration. Pride and dignity of work accomplishments will be of utmost importance.

GENERAL COURSE OBJECTIVES

Objectives	Activities to Achieve Objectives
1. To develop specific skills associated with the occupation of mechanical drafting.	1. Series of individual jobs. 2. Series of group jobs. 3. Series of demonstration lessons. 4. Provide job sheets and operation sheets for individual student use. 5. Provide visual aids such as films, models and sample drawings.
2. To develop sufficient related information dealing with mechanical drafting.	1. Provide information lessons of group discussion topics. 2. Provide information sheets and assignment sheets for individual use. 3. Provide necessary trade literature for student reference. 4. Plan for field trips and technical meetings of engineering societies. 5. Provide films of industry.
3. To develop good work habits.	1. Provide standards of workmanship. 2. Provide standards of organization and cleanliness. 3. Discuss with students the importance of good work habits in relation to an industrial environment. 4. Measure students' work objectively. 5. Maintain accurate student progress records.
4. To develop an awareness of building safety into machines and mechanisms.	1. Demonstration of safety devices used on machinery such as belt and chain guards. 2. Provide industrial safety films.
5. To develop ability to work cooperatively with fellow workers.	1. Provide for group projects. 2. Stress the importance of getting along with people--advancement.
6. To stimulate the development of leadership qualities.	1. Provide for the students to plan their own group project. 2. Plan for students to evaluate each other. 3. Group discussions about good leadership qualities.

PLAN OF INSTRUCTIONAL PRACTICES

Introduction

The smoothness of instruction depends on the careful organization of the routine details concerning the pupil, equipment, teaching methods or physical details. The teacher must crystallize his thinking regarding the best teaching practices and he must formulate a very definite statement of the basic standards to follow in teaching the course to bring about the attainment of the learning goals. From time to time, some of the practices recommended may be altered to meet required changes in instructional situations and to meet changes in the technological phases of the occupation.

Vehicles of Instruction

The application phase of this course of study consists of jobs assigned to students for completion. To provide for individual differences, job sheets, operation sheets, information sheets and assignment sheets should be used. Each student will be permitted to progress at his own learning rate, with special attention given to the slow learner.

Teaching Methods

To achieve the desired results in this course of study the following procedures are recommended:

1. Demonstrations--Brief skill demonstrations given by the instructor displaying correct and safe procedures of the skill competencies while the students observe and/or participate. This activity should consume approximately 10 percent of the student's scheduled time.

2. Lecture--Short theory lessons in the form of lecture and class discussion by the instructor and/or students should be planned to teach the related information part of the course. Approximately five percent of time should be devoted to this activity and related to the day's job assignment.

3. Laboratory Talks--Short, informal talks by the instructor during laboratory activities, to convey information pertinent to the activity in session. This is an untimed teacher activity as it may occur at anytime and for periods of various duration.

Teaching Aids

Some of the teaching aids recommended for this course are films, film strips, overhead transparencies, chalkboard, tool display, industrial samples, brochures, speakers (professional/tradesmen), etc. A more complete list is given in the bibliography.

Live work--jobs needed by the school will be utilized whenever possible. Mockups, warehousing models and diverse materials handling systems can be utilized to complete the laboratory activities defined in the following course outline.

Items for Development by Local Teacher

The following items are peculiar to the local school situation and need to be developed by each local instructor:

- . Standards of attainment required
- . Pupil work evaluation
- . Shop controls and regulations
- . Pupil personnel organization
- . Method of tool check
- . Records and forms

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COURSE OUTLINE

Instructional Title: Drafting, Mechanical Code: 17.1302

Occupation Description

Performs duties of Draftsman I specializing in drafting detailed working drawings of machinery and mechanical devices, indicating dimensions and tolerances, fasteners and joining requirements, and other engineering data. Drafts multiple-view assembly and subassembly drawings as required for manufacture and repair of mechanisms.

Major Divisions of the Occupation

I. The Graphic Language

II. Use and Care of Instruments

III. Lettering

IV. Geometric Construction

V. Multiview Projection

VI. Freehand Sketching

VII. Reproduction and Control of Drawings

VIII. Sectional Views

IX. Auxiliary Views

X. Revolutions

XI. Axonometric and Oblique

Skill Competency Development Jobs

The following is a list of suggested Jobs, assigned by the teacher, to provide experiences for the student to assist him in developing competencies of the Mechanical Drafting trade. These are Job Titles only. The numbers correspond with the identifying numbers on the Job Sheets that follow.

NOTE: No student jobs are assigned for Unit I. However, assignment sheets will be available to supplement the textbook readings.

Unit II. Use and Care of Instruments

J-2-1	Draw horizontal, vertical and inclined lines
J-2-2	Draw solid, hidden and compass lines
J-2-3	Draw circles and arcs
J-2-4	Use adjustable triangle, protractor, compass, and architect's scale

Unit III. Lettering

J-3-1	Letter straight-line vertical caps
J-3-2	Letter curved-line and straight-line vertical caps
J-3-3	Letter vertical numbers

Unit IV. Geometric Construction

J-4-1	Bisect line
J-4-2	Bisect and transfer angle
J-4-3	Construct parallel lines
J-4-4	Divide line into equal parts, using dividers and parallel line method
J-4-5	Divide line into proportional parts
J-4-6	Construct triangle, bisect angles, and inscribe circle
J-4-7	Construct a right triangle and draw circle through the vertices

J-4-8	Erect perpendicular lines
J-4-9	Construct equilateral triangle
J-4-10	Construct square on inclined plane
J-4-11	Construct a square on the inside and then on the outside of the circle
J-4-12	Construct a Pentagon
J-4-13	Construct a hexagon
J-4-14	Inscribe an octagon in a square
J-4-15	Transfer a triangle
J-4-16	Draw a circle through three established points
J-4-17	Draw lines tangent to a circle
J-4-18	Construct "open belt" tangents
J-4-19	Construct arc tangent to perpendicular lines
J-4-20	Construct arc tangent to any intersecting lines
J-4-21	Construct arc tangent to arcs
J-4-22	Construct arc tangent to circles
J-4-23	Design an ogee curve
J-4-24	Construct ellipse by foci method
J-4-25	Construct ellipse by concentric-circle method
J-4-26	Construct ellipse by parallelogram method
J-4-27	Draw a parabola
J-4-28	Draw a hyperbola
J-4-29	Draw a spiral of Archimedes
J-4-30	Draw a helix
J-4-31	Draw an involute of a triangle
J-4-32	Draw an involute of a circle

J-4-33 Draw one view of a rocker arm

J-4-34 Draw one view of a caliper

J-4-35 Draw one view of a special cam

J-4-36 Draw one view of a shaft hanger casting

J-4-37 Draw one view of a shift lever

J-4-38 Draw one view of a gear arm

J-4-39 Draw one view of a form roll lever

J-4-40 Draw one view of a special S-wrench

J-4-41 Draw one view of an auto headlight reflector

Unit V. Multiview Projections

J-5-1 Draw three views of a stop block

J-5-2 Draw three views of a holder

J-5-3 Draw three views of a slide

J-5-4 Draw three views of a terminal

J-5-5 Draw three views of a base

J-5-6 Draw three views of a wedge

J-5-7 Draw three views of a vise base

J-5-8 Draw three views of a bracket

J-5-9 Draw three views of a locator

J-5-10 Draw three views of a V-stop

J-5-11 Draw three views of a bracket

J-5-12 Draw three views of an angle block

J-5-13 Draw three views of a wedge block

J-5-14 Draw three views of a guide finger

J-5-15 Draw three views of a rod head

J-5-16 Draw necessary views of a safety key

J-5-17 Draw necessary views of a finger guide

J-5-18 Draw necessary views of a tailstock clamp

J-5-19 Draw necessary views of a cam

J-5-20 Draw necessary views of a cut-off holder

J-5-21 Draw necessary views of a frame guide

J-5-22 Draw necessary views of a cross-feed stop

Unit VI. Freehand Sketching

J-6-1 Sketch views and add missing lines *(5-51-1, -2, -3, -4)

J-6-2 Sketch views and add missing lines *(5-51-5, -6, -7, -8)

J-6-3 Sketch views and add missing lines *(5-51-9, -10, -12-, -13)

J-6-4 Sketch views and add missing lines *(5-52-2, -3, -5, -6)

J-6-5 Sketch views and add missing lines *(5-52-12, -16, -24)

* Use example shown in bibliography number 1, or appropriate example from similar text.

Unit VII. Reproduction and Control of Drawing

NOTE: No student jobs are assigned for Unit 7. However, assignment sheets will be available to supplement the text.

Unit VIII. Sectional Views

J-8-1 Draw full section and other views of a bearing

J-8-2 Draw half section and other views of a truck wheel

J-8-3 Draw full section through rib and other views of a column support

J-8-4 Draw full section and revolve holes to cutting plane of a special bearing

J-8-5	Draw full section and revolve rib to cutting plane of a pulley
J-8-6	Draw views, including a revolved section of a dash pot lifter
J-8-7	Draw view and offset sections as indicated

Unit IX. Auxiliary Views

J-9-1	Draw auxiliary view using folding line method -- *(Object #1)
J-9-2	Draw auxiliary view using folding line method -- *(Object #2)
J-9-3	Draw auxiliary view using reference line method -- *(Object #3)
J-9-4	Draw auxiliary view using reference line method -- *(Object #4)
J-9-5	Draw auxiliary view using reference line method -- *(Object #5)
J-9-6	Draw auxiliary view using reference line method -- *(Object #6)
J-9-7	Draw auxiliary view using reference line method -- *(Object #7)
J-9-8	Draw partial auxiliary and regular views of an anchor bracket
J-9-9	Draw partial auxiliary and regular views of a guide bracket
J-9-10	Draw views of a control bracket
J-9-11	Draw views of a drill press bracket
J-9-12	Draw secondary auxiliary view of a dovetail slide

* Use example shown in bibliography number 1, or appropriate example from similar text.

Unit X. Revolutions

J-10-1	Revolve the prism
J-10-2	Revolve block #1
J-10-3	Revolve block #2
J-10-4	Revolve the pyramid

Unit XI. Axonometric and Oblique

J-11-1	Draw isometric drawing of a key plate
J-11-2	Draw isometric drawing of a strap
J-11-3	Draw isometric drawing of a bracket
J-11-4	Draw isometric drawing of a cutter block
J-11-5	Draw isometric drawing of a house model
J-11-6	Draw isometric drawing of a guide block
J-11-7	Draw isometric drawing of a tailstock clamp
J-11-8	Draw isometric drawing of a table support
J-11-9	Draw isometric drawing of an intersection
J-11-10	Draw isometric drawing of a control block
J-11-11	Draw isometric half section of a hex cap
J-11-12	Draw isometric drawing of a book end
J-11-13	Draw oblique view of a rod guide
J-11-14	Draw oblique view of a follower
J-11-15	Draw oblique view of a gland
J-11-16	Draw oblique view of a control arm
J-11-17	Draw half oblique section of a step cone
J-11-18	Draw oblique view of an angle bearing

Skill Competencies and Information Lessons

The left hand column lists the tasks or operations which form the skill competency required of the student. These competencies should be demonstrated by the teacher and practiced by the student.

The information lessons outline the general technical information and knowledge needed to perform the skill competencies. These items represent a common information taught on a group instruction basis. Additional information will emerge to be taught on an individual student basis as pupils work on the skill competencies.

The numbers preceding each title correspond to the identifying numbers of the operation sheets and the information sheets. The information lessons relate to the particular major unit of instruction but do not necessarily relate to corresponding skill competency numbers.

Unit I. The Graphic Language

Skill Competencies/Operations	Information Lessons	
	IL-1-1	History of mechanical drawing
	IL-1-2	Why drawings are made
	IL-1-3	Drawing--a universal language
	IL-1-4	Drawings--simple vs. complicated
	IL-1-5	Parallel line projection methods

Unit II. Use and Care of Instruments

Skill Competencies/Operations		Information Lessons	
SC-2-1	Aligning and fastening the plate to the drawing board	IL-2-1	Required tools for a "standard" tool kit
SC-2-2	Laying out plate border and title block	IL-2-2	Safety in the drawing room
SC-2-3	Using the parallel bar and drafting machine	IL-2-3	Care of drawing instruments
SC-2-4	Drawing construction lines	IL-2-4	Methods of fastening paper on the drawing board
SC-2-5	Erasing properly	IL-2-5	Grades of pencils
SC-2-6	Using and maintaining pencil points	IL-2-6	Pencil sharpening devices
SC-2-7	Using the architect's scale	IL-2-7	Types of parallel bars, T-Squares, and straight edges
SC-2-8	Using the engineers scale	IL-2-8	Types of drafting machines
SC-2-9	Using the 30-60 and 45° triangles in combination	IL-2-9	Drawing materials
SC-2-10	Using the adjustable triangle	IL-2-10	Drawing sheet sizes
SC-2-11	Using the compass	IL-2-11	Cleanliness procedures
SC-2-12	Using the dividers	IL-2-12	Use of reference material
SC-2-13	Using various templates	IL-2-13	Theory of line weights
SC-2-14	Using various irregular curves	IL-2-14	Types of scales
		IL-2-15	Types of erasers
		IL-2-16	Various methods of measuring angles
		IL-2-17	Types of irregular curves
		IL-2-18	Time saving devices

Unit III. Lettering

Skill Competencies/Operations		Information Lessons	
SC-3-1	Using the lettering guide	IL-3-1	Types of lettering devices
SC-3-2	Lettering vertical caps and numbers		

Unit IV. Geometric Construction

Skill Competencies/Operations		Information Lessons	
SC-4-1	Darkening lines	IL-4-1	Applications of the proportional dividers
SC-4-2	Keeping the drawing clean	IL-4-2	When to use templates
SC-4-3	Bisecting a line	IL-4-3	Practical applications of dividing lines
SC-4-4	Bisecting an angle	IL-4-4	Practical applications of tangent points
SC-4-5	Transferring angles	IL-4-5	Types of solids
SC-4-6	Drawing parallel lines		
SC-4-7	Dividing lines into equal and proportional parts		
SC-4-8	Dividing lines using the parallel-line method		
SC-4-9	Constructing triangles when sides are given		
SC-4-10	Constructing right triangles when two sides given		
SC-4-11	Constructing perpendicular lines		
SC-4-12	Constructing squares		
SC-4-13	Constructing pentagons		
SC-4-14	Constructing hexagons		

Skill Competencies/Operations		Information Lessons
SC-4-15	Constructing octagons	
SC-4-16	Using the prick-point method of checking	
SC-4-17	Determining tangent points	
SC-4-18	Drawing an ogee curve	
SC-4-19	Using the foci method of drawing an ellipse	
SC-4-20	Using the concentric-circle method of drawing an ellipse	
SC-4-21	Using the parallelogram method of drawing an ellipse	
SC-4-22	Constructing a parabola	
SC-4-23	Constructing a hyperbola	
SC-4-24	Constructing Archimede's spiral	
SC-4-25	Constructing a helix	
SC-4-26	Constructing an involute	

Unit V. Multiview Projection

Skill Competencies/Operations	Information Lessons
SC-5-1 Determining the necessary views	IL-5-1 Revolution conventions
SC-5-2 Estimating spacing of orthographic views	IL-5-2 What are space curves?
SC-5-3 Using the numbering system in multiview projection	IL-5-3 Methods of representing fillets, rounds and runouts
SC-5-4 Laying out the orthographic views	IL-5-4 Comparison of RH and LH parts
SC-5-5 Checking views for completeness	

Unit VI. Freehand Sketching

Skill Competencies/Operations	Information Lessons
SC-6-1 Making freehand sketches	IL-6-1 Practical applications of freehand sketching

Unit VII. Reproduction and Control of Drawings

Skill Competencies/Operations	Information Lessons
NOTE: No student jobs are assigned for Unit 7. However, assignment sheets will be available to supplement the text.	

Unit VIII. Sectional Views

Skill Competencies/Operations		Information Lessons	
SC-8-1	Drawing sectional views	IL-8-1	Methods of sectioning ribs, arms and holes
SC-8-2	Revolving holes and ribs in section	IL-8-2	When to use sections

Unit IX. Auxiliary Views

Skill Competencies/Operations		Information Lessons	
SC-9-1	Estimating spacing of auxiliary views	IL-9-1	What are normal surfaces?
SC-9-2	Transferring measurements and projecting auxiliary views	IL-9-2	What are inclined surfaces?
SC-9-3	Using the folding line method of projecting auxiliary views	IL-9-3	Why draw auxiliary views?
SC-9-4	Using the reference line method of projecting auxiliary views	IL-9-4	What are auxiliary sections?
SC-9-5	Drawing secondary auxiliary views		

Unit X. Revolutions

Skill Competencies/Operations		Information Lessons	
SC-10-1	Revolving a prism	IL-10-1	Practical applications of revolutions

Unit XI. Axonometric and Oblique

Skill Competencies/Operations		Information Lessons	
SC-11-1	Determining the axis position for isometric drawings	IL-11-1	Types of pictorial drawing
SC-11-2	Drawing circles in isometric views	IL-11-2	Comparison of Cavalier and Cabinet projection
SC-11-3	Drawing irregular curves in isometric views	IL-11-3	What are oblique surfaces?
SC-11-4	Determining the axis position for oblique views		
SC-11-5	Drawing circles in oblique views		
SC-11-6	Drawing irregular curves in oblique views		

WRITTEN INSTRUCTIONAL AIDS

Introduction

Instruction sheets are aids used in developing the most effective and efficient teaching-learning situation that is possible. Four types of sheets are generally used including job sheets, operation sheets, information sheets and assignment sheets.

The job involves a sequential performance of operations by the learner to "tryout" and develop the skill competencies (operations) of the occupation resulting in a product or service. It is the vehicle of instruction or the media by which the student practices and develops a series of skill competencies (operations). JOB SHEETS indicate to the student what to do in performing the various jobs assigned by the instructor. The jobs that will be used as vehicles of instruction in the course are listed in the COURSE OUTLINE section.

Operations are the subdivisions in the breakdown of a job. Each operation represents a process, way of doing or how to perform the particular skill competency or operation.

OPERATION SHEETS supplement the job sheets and indicate to the student how to perform the many skill competency operations necessary to complete the assigned jobs. The operations that will be taught in the course are listed in the COURSE OUTLINE section under skill competencies/operations. The operation sheets should be numbered to correspond with the Skill Competencies listed in the course outline.

INFORMATION SHEETS supplement the job sheets and provide the student with information necessary for completing the assigned jobs with highest possible degree of understanding. The information units that will be stressed in the course are listed in the course outline under information lessons. The information sheets included in this section should be numbered to correspond with the Information Lessons listed in the course outline.

ASSIGNMENT SHEETS supplement the job sheets and provide the student with mental activities necessary to learn the "knowing" that accompanies the "doing" of a trade. The student is assigned related studies or technical information to be "sought out" by the student on an individual basis through the use of problems or "exercises". The Assignment Sheets should be numbered to correspond with the Information Lessons listed.

NOTE: All drawing numbers and figure numbers refer to drawings and figures in bibliography number 1, Technical Drawing, Giesecke, Mitchell, Spencer, Hill. MacMillan Publishing Company. Appropriate examples that provide similar instructional practices may also be used from other texts/references.

JOB: Draw Horizontal, Vertical and Inclined Lines

JOB SHEET IDENTIFICATION CODE

UNIT II: Use and Care of Instruments

JOB NUMBER: J-2-1

COURSE: Mechanical Drafting

DRAWING NUMBER: 2-83

MATERIAL: A-Vellum
Masking tape

TOOLS:
- 1 - 6H pencil
- 1 - 2H pencil
- 1 - 30°-60° triangle
- 1 - 45° triangle
- 1 Brush
- 1 Architectural Scale
- 1 Bow divider
- 1 File and Cleaning cloth
- 1 Soft eraser

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Align and tape plate to board.	. Figure 2-55
2. Layout sheet according to layout A-2.	. Figure 1 & 3
3. Divide working space.	. Figure 2-83
4. Use bow dividers to space horizontal lines.	
5. Draw horizontal lines (lightly) using 6H pencil.	
6. Use bow dividers to space vertical lines.	
7. Draw vertical lines (lightly) using 6H pencil.	
8. Draw construction lines AB using 6H pencil.	
9. Set off 1/2" spaces with bow dividers on these construction lines.	
10. Draw the inclined lines lightly using your 30°-60° and 45° triangles in combination.	. Figure 2-31
11. Erase all unnecessary construction lines.	
12. Darken the horizontal lines with a 2H pencil.	. Figure 2-15

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
13. Darken vertical and inclined lines.	
14. Check for completeness.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Solid, Hidden and Compass Lines

JOB SHEET IDENTIFICATION CODE

UNIT II: Use and Care of Instruments

JOB NUMBER: J-2-2

COURSE: Mechanical Drafting

DRAWING NUMBER: 2-84

MATERIAL: A-vellum Masking tape

TOOLS:
1 - 2H, 3H, and 6H Pencil
1 - 30°-60° triangle
1 - 45° triangle
1 Architectural scale
1 Bow dividers
1 Bow pencil
1 Soft eraser
1 Erasing shield
1 File and cleaning cloth
1 Brush

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Align and tape vellum to board.	. Figure 2-55
2. Layout sheet.	. Layout A-2 (inside back cover Figures 1 and 3.)
3. Divide working space into six equal rectangles.	. Figure 2-84
4. Use bow dividers to space off 8 equal spaces for horizontal lines.	
5. Draw horizontal lines (lightly) using 6H pencil.	
6. Use architects scale to space off vertical lines.	
7. Draw vertical lines (lightly) using 6H pencil.	
8. Locate centers of other rectangles by the use of diagonals.	
9. From the centers set off the spacing using the dividers.	
10. Draw straight-line constructions (lightly) using 6-H pencil.	
11. Draw curved-line constructions (lightly) with compass (you should have two compass leads--one for drawing light construction and one for darkening).	

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
12. Erase all unnecessary construction lines.	
13. Darken horizontal and vertical lines.	. Figure 2-15
14. Darken inclined lines to correct weight.	
15. Darken arcs (change compass lead).	
16. Check lines for completeness.	
17. Remove drawing from board.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Circles and Arcs

UNIT II: Use and Care of Instruments

COURSE: Mechanical Drafting

MATERIAL: A-Vellum
Masking tape

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-2-3

DRAWING NUMBER: 2-86

TOOLS:
1 - 2H, 3H and 6H Pencil
1 - 30°-60° triangle
1 - 45° triangle
1 Architectural scale
1 Bow compass
1 Soft eraser
1 Erasing shield
1 File and cleaning cloth
1 Brush

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Align and tape vellum to board.	. Figure 2-55
2. Layout sheet.	. Layout A-2
3. Locate and draw lightly the center lines.	
4. Locate and draw lightly the centers for the rest of the circles and arcs.	
5. Draw circles and arcs lightly and check for tangency.	
6. Darken circles and arcs.	
7. Darken straight lines.	
8. Check for completeness.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Use Adjustable Triangle, Protractor, Compass and Architect's Scale

JOB SHEET IDENTIFICATION CODE

UNIT II: Use and Care of Instruments

JOB NUMBER: J-2-4

COURSE: Mechanical Drafting

DRAWING NUMBER: 2-91

MATERIAL: A-Vellum Masking tape

TOOLS:
1 - 2H, 3H and 6H pencil
1 Adjustable triangle
1 File and cleaning cloth
1 Brush
1 Bow pencil
1 Architect's scale
1 Soft eraser
1 Erasing shield

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout shape of plate starting at "A" and working toward B-C-etc. (use adjustable triangle). CAUTION: Use extreme accuracy in measuring distances and angles.	
2. Layout centers of arcs and circles.	
3. Erase unnecessary construction and check for completeness.	
4. Darken arcs and circles.	
5. Darken straight lines.	
6. Scale the distance KA and put that dimension on the drawing.	
7. Check for completeness.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness
4. Line quality.
5. Time required.

JOB: Letter Straight-Line Vertical Caps

UNIT III: Lettering

COURSE: Mechanical Drafting

MATERIAL: A-Vellum   Masking tape

TOOLS:
1 - 2H and 6H pencil
1 Lettering guide
1 Brush
1 Eraser and shield
1 File and cleaning cloth
1 Architect's scale

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET
IDENTIFICATION CODE

JOB NUMBER: J-3-1

DRAWING NUMBER: 3-46

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout sheet.	. Figure 3-46
2. Use lettering guide to draw guide lines (very lightly) for 1/2" letters.	
3. Use lettering guide to draw guide lines (very lightly) for 1/4" letters.	
4. Letter 1/2" vertical letters.	. Figures 3-46 and 3-19
5. Letter 1/4" vertical letters.	. Figures 3-46 and 3-19

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB:	Letter Curved and Straight-Line Vertical Caps		JOB SHEET IDENTIFICATION CODE
UNIT III:	Lettering		JOB NUMBER: J-3-2
COURSE:	Mechanical Drafting		DRAWING NUMBER: 3-47
MATERIAL:	A-Vellum	Tape	
TOOLS:	1 2H and 6H pencil 1 Lettering guide 1 Brush	1 Eraser and shield 1 File and cleaning cloth 1 Architect's scale	

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout sheet.	. Figure 3-47
2. Use lettering guide to draw guide lines (very lightly) for 1/2" letters.	
3. Use lettering guide to draw guide lines (very lightly) for 1/4" letters.	
4. Letter 1/2" vertical letters.	. Figures 3-47 and 3-19
5. Letter 1/4" vertical letters.	. Figures 3-47 and 3-19

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Letter Vertical Numbers

UNIT III: Lettering

COURSE: Mechanical Drafting

MATERIAL: A-Vellum Masking tape

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-3-3

DRAWING NUMBER: 3-49

TOOLS:
1 - 2H and 6H pencil
1 Lettering guide
1 Brush
1 Eraser and shield
1 File and cleaning cloth
1 Architect's scale

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout sheet.	. Figure 3-49
2. Use lettering guide to draw guide lines (very lightly) for 1/2" numbers.	
3. Use lettering guide to draw guide lines (very lightly) for 1/4" numbers.	
4. Letter 1/2" numbers.	. Figure 3-19
5. Letter 1/4" numbers.	. Figure 3-19

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Bisect Line

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum Tape

__JOB SHEET__
__IDENTIFICATION CODE__

JOB NUMBER: J-4-1

DRAWING NUMBER: 4-1

TOOLS:
- 1 - 2H and 6H pencil
- 1 - 30° and 60° triangle
- 1 File and cleaning cloth
- 1 Brush
- 1 Eraser and shield
- 1 Architect's scale
- 1 Bow pencil
- 1 Lettering guide

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout inclined line 2.50" long on any angle.	
2. Swing arcs from both ends of the line.	. Figure 4-68
3. Draw bisector line through the intersection of the arcs.	
4. Erase any unnecessary construction lines.	
5. Darken 2.50" line and bisector line.	
6. Check for completeness.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Bisect and Transfer Angle

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum Tape

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-2

DRAWING NUMBER: 4-2

TOOLS:

- 1 - 2H and 6H pencil
- 1 - 30°-60° triangle
- 1 File and cleaning cloth
- 1 Brush
- 1 Eraser and shield
- 1 Architect's scale
- 1 Bow pencil
- 1 Lettering guide

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to.	TEACHING/LEARNING ACTIVITIES
1. Layout two lines forming any acute angle.	. Figure 4-10
2. Swing arcs and label points A, B, and C.	. Figure 4-11
3. Draw bisector line.	. Figure 4-69
4. Transfer one half of angle to new position.	. Figure 4-69
5. Erase unnecessary construction lines.	
6. Darken sides and bisector line of angles.	
7. Check for completeness.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Construct Parallel Lines

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-3

DRAWING NUMBER: 4-3

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout inclined line AB.	. Figure 4-12
2. Swing 1-5/8" arcs.	. Figure 4-12
3. Construct line parallel to AB.	. Figure 4-12
4. Erase any unnecessary construction lines.	
5. Darken parallel lines.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Divide Line into Equal Parts Using Dividers and Parallel-Line Method

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-4

DRAWING NUMBER: 4-4

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout a horizontal line 3.75" long. (Keep this line in the upper half of the space).	
2. Divide the line into five equal spaces with the dividers.	
3. Layout an inclined line 2.81" long.	
4. Divide the line into three equal parts by the parallel-line method.	. Figure 4-15
5. Darken both divided lines.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Divide Line into Proportional Parts

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-5

DRAWING NUMBER: 4-5

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout a line 3.62" long.	. SC-2-8
2. Divide it into three proportional parts of 3.5:9.	. Figure 4-17
3. Let all construction lines on drawing.	
4. Darken 3.62" line.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.
4. Time required.

JOB: Construct Triangle, Bisect Angles and Inscribe Circle

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-6

DRAWING NUMBER: 4-7

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Construct a horizontal line AB 3.25" long in the lower part of the drawing space.	. SC-2-8 . SC-4-4
2. Swing 3" arc from A.	. SC-2-11
3. Swing 2.50" arc from B.	
4. Connect lines from A and B to the intersection of arcs C.	. Figure 4-19
5. Label the length of each side of the triangle.	
6. Bisect the three interior angles (the bisector lines should intersect at a common point).	
7. Inscribe a circle touching the three sides and having its center at the intersection of the bisector lines.	
8. Darken the triangle and circle.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-7

DRAWING NUMBER: 4-8

JOB: Construct a Right Triangle and Draw Circle Through the Vertices

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout a horizontal line AB 2-1/2" long.	. SC-2-7
2. Draw a semicircle from A to B with its center on the midpoint of line AB.	. SC-2-11
3. Swing 1-9/16" arc from A to intersect semicircle-point C.	. SC-4-4
4. Connect A to C and C to B to form right triangle.	
5. Bisect the three interior angles.	
6. Inscribe circle.	
7. Darken triangle and inscribed circle.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Erect Perpendicular Lines

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-8

DRAWING NUMBER: 4-9

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING-LEARNING ACTIVITIES
1. Layout an inclined line QR 3-5/16" long.	. SC-4-11
2. Select a point "P" on the line 1-1/4" from "Q."	
3. Erect a perpendicular line at P.	. Figure 18c
4. Darken 3-5/16" line and the perpendicular.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Construct Equilateral Triangle

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-9

DRAWING NUMBER: 4-12

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout a line AB 2-1/2" long. 2. Swing 2-1/2" arcs from each end of the line until they intersect forming point C. 3. Connect C to A and C to B. 4. Bisect interior angles. 5. Inscribe circle. 6. Darken triangle and circle.	. SC-4-4

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Construct Square on Inclined Plane
UNIT IV: Geometric Construction
COURSE: Mechanical Drafting
MATERIAL: A-Vellum
TOOLS: Standard tool kit
TEXT/REFERENCE:
Bibliography Number 1

JOB SHEET IDENTIFICATION CODE
JOB NUMBER: J-4-10
DRAWING NUMBER: 4-13

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout an inclined line TU 2.19" long.	. SC-4-11
2. Erect perpendiculars from T and U.	
3. Measure out on perpendiculars 2.19".	
4. Draw line to complete square.	. Figure 4-23
5. Darken square.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB:	Construct a Square on the Inside and Then on the Outside of a Circle	JOB SHEET IDENTIFICATION CODE	
UNIT IV:	Geometric Construction	JOB NUMBER:	J-4-11
COURSE:	Mechanical Drafting	DRAWING NUMBER:	4-14
MATERIAL:	A-Vellum		
TOOLS:	Standard tool kit		

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a 2.12" diameter circle lightly.	. SC-4-12
2. Inscribe a square in the circle.	. Figure 4-23
3. Circumscribe a square on the circle.	. Figure 4-23
4. Darken the squares.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Construct a Pentagon
UNIT IV: Geometric Construction
COURSE: Mechanical Drafting
MATERIAL: A-Vellum
TOOLS: Standard tool kit
TEXT/REFERENCE:
Bibliography Number 1

JOB SHEET IDENTIFICATION CODE
JOB NUMBER: J-4-12
DRAWING NUMBER: 4-15

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a 2-1/2" diameter circle (lightly).	. SC-4-13
2. Construct the vertices of a regular inscribed pentagon.	. Figure 4-24
3. Connect the vertices to form the pentagon.	
4. Construct star by drawing two lines from each corner to the two opposite corners.	
5. Darken pentagon and star.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Construct a Hexagon

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-13

DRAWING NUMBER: 4-16

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a 2-1/2" diameter circle (lightly).	. SC-4-14
2. Inscribe a hexagon.	. Figure 4-25
3. Circumscribe a hexagon.	. Figure 4-26.
4. Darken hexagons.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Inscribe an Octagon in a Square
UNIT IV: Geometric Construction
COURSE: Mechanical Drafting
MATERIAL: A-Vellum
TOOLS: Standard tool kit
TEXT/REFERENCE:
Bibliography Number 1

JOB SHEET IDENTIFICATION CODE
JOB NUMBER: J-4-14
DRAWING NUMBER: 4-17

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout a square with 2-1/2" sides.	. SC-4-15
2. Swing arcs from corners.	. Figure 4-28
3. Inscribe Octagon.	. Figure 4-28
4. Darken octagon.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Transfer a Triangle
UNIT IV: Geometric Construction
COURSE: Mechanical Drafting
MATERIAL: A-Vellum
TOOLS: Standard tool kit
TEXT/REFERENCE:
Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-15

DRAWING NUMBER: 4-18

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Construct a triangle having sides of 2.00", 1.50" and 2.88". CAUTION: Space triangle in left half of drawing area.	. SC-4-9 . SC-4-5 . SC-4-16
2. Transfer this triangle to a new position and turned 180°.	. Figure 4-29
3. Check by the prick-point method.	
4. Darken both triangles.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw a Circle Through Three Established Points

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-16

DRAWING NUMBER: 4-20

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Locate three points approximately.	. Figure 4-32
2. Locate the center of a circle that when drawn will pass through the three points.	. Figure 4-23
3. Darken circle.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-17

DRAWING NUMBER: 4-21

JOB: Draw Lines Tangent to a Circle

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout a 2-1/2" diameter circle.	. SC-4-17
2. Assume a point 5" on the left side of the circle.	
3. Draw a tangent at that point.	. Figure 4-34
4. Assume a point T to the right of the circle 2" from its center.	
5. Draw two tangents to the circle through the point.	
6. Darken circle and tangent lines.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Construct "Open Belt" Tangents
UNIT IV: Geometric Construction
COURSE: Mechanical Drafting
MATERIAL: A-Vellum
TOOLS: Standard tool kit
TEXT/REFERENCE:
Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-18
DRAWING NUMBER: 4-22

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw horizontal center line through the center of space.	
2. Construct two circles 2" in diameter and 1-1/4" diameter with centers 2-1/8" apart on the center line.	
3. Draw "open belt" tangents to the circles.	. Figure 4-35a
4. Darken circles, tangents and center lines.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.
4. Cleanliness.
5. Time required.

JOB:	Construct Arc Tangent to Perpendicular Lines	JOB SHEET IDENTIFICATION CODE	
UNIT IV:	Geometric Construction	JOB NUMBER:	J-4-19
COURSE:	Mechanical Drafting	DRAWING NUMBER:	4-27
MATERIAL:	A-Vellum		
TOOLS:	Standard tool kit		

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a horizontal line near center of space.	. SC-4-17
2. Draw a vertical line near center of space.	
3. Determine and mark tangent points for a 1-1/2" radius connecting the lines.	. Figure 4-37
4. Draw the arc tangent to the lines.	
5. Darken arc and straight lines. CAUTION: Do not darken arc beyond tangent points.	. Figure 4-37

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Construct Arc Tangent to Any Intersecting Lines

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-20

DRAWING NUMBER: 4-28

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout horizontal line 3/4" up from bottom of space.	. SC-4-17
2. Select a point on the line 2" from the left side of the space.	
3. Layout a line through this point upward and to the right at 60° to the horizontal.	
4. Layout arc of 1-3/8" radius tangent within obtuse angle. (Mark tangent points.)	. Figure 4-38
5. Layout arc of 1-3/8" radius tangent within acute angle. (Mark tangent points.)	. Figure 4-38
6. Darken arcs to tangent points and straight lines. CAUTION: Do not darken arcs beyond the tangent points.	. Figure 4-38

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Construct Arc Tangent to Arcs

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-21

DRAWING NUMBER: 4-31

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw horizontal line 3/4" up from bottom of space.	. SC-4-17
2. Locate points 3-3/8" apart on this line.	
3. Draw .94" radius arc from left point.	
4. Draw 1.75" radius arc from right point.	
5. Locate center of a 1.25" radius arc to be drawn tangent to these arcs.	
6. Locate the tangent points.	. Figure 4-40
7. Draw the 1.25" radius arc.	
8. Darken arcs.	
CAUTION: Do not darken arcs beyond the tangent points.	

METHOD OF EVALUATION:

1. Accuracy.
2. Neatness.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Construct Arc Tangent to Circles
UNIT IV: Geometric Construction
COURSE: Mechanical Drafting
MATERIAL: A-Vellum
TOOLS: Standard tool kit
TEXT/REFERENCE:
Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-22

DRAWING NUMBER: 4-32

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a horizontal line 2" up from the bottom of space.	. SC-4-17
2. Locate points 3-3/8" apart on this line.	
3. Draw .94" radius from the left point.	
4. Draw 1.75" radius from the right point.	
5. Locate the center for a 2-3/4" arc to be drawn tangent to the upper sides of the arcs.	. Figure 4-41a
6. Locate the tangent points and draw the arc.	
7. Locate the center for a 2" arc to be drawn tangent to the upper side of the right-hand arc and the lower side of the left arc.	. Figure 4-41b
8. Locate the tangent points and draw the arc.	
9. Darken all four arcs. CAUTION: Do not darken 2" and 2-3/4" arcs past their tangent points.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Design an Ogee Curve

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-23

DRAWING NUMBER: 4-33

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw two parallel inclined lines 1-3/4" apart.	. SC-4-18
2. Choose a point on each line and label them A and B.	
CAUTION: The straight-line distance between the points should be between 2-1/2" and 2-3/4".	
3. Draw a straight line between the points.	
4. Determine a point T on this line 1/3 the distance between A and B.	
5. Draw an ogee curve connecting A to B and passing through T.	. Figure 4-43
6. Darken curve.	. Figure 4-43

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Construct Ellipse by Foci Method
UNIT IV: Geometric Construction
COURSE: Mechanical Drafting
MATERIAL: A-Vellum
TOOLS: Standard tool kit
TEXT/REFERENCE:
Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-24
DRAWING NUMBER: 4-35

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw horizontal and vertical center lines with their intersection near the center of the space.	. SC-4-19
2. Lay off the major axis of 4" on the horizontal line.	. Figure 4-48
3. Lay off the minor axis of 2-1/2" on the vertical line.	
4. Layout an ellipse by the foci method with at least five points in each quadrant.	. Figure 4-48
5. Darken ellipse.	. Figure 4-48

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Construct Ellipse by Concentric-Circle Method

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-25

DRAWING NUMBER: 4-37

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw horizontal and vertical center lines with the intersection near the center of the space.	. SC-4-20 . SC-2-14
2. Lay off the major axis of 4" on the horizontal line.	. Figure 4-50
3. Lay off the minor axis of 2-1/2" on the vertical line.	
4. Layout an ellipse by the concentric-circle method using intervals of 15° each.	
5. Darken ellipse.	. Figure 4-50

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Construct Ellipse by Parallelogram

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET
IDENTIFICATION CODE

JOB NUMBER: J-4-26

DRAWING NUMBER: 4-38

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout major axis of 4".	. SC-4-21
2. Layout minor axis of 2-1/2".	. SC-2-14
3. Construct an ellipse by the parallelogram.	. Figure 4-52a
4. Darken ellipse with the aid of an irregular curve.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw a Parabola

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-27

DRAWING NUMBER: 4-42

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a horizontal line 1" up from the bottom of the space and label this line DIRECTRIX.	. SC-4-22 . SC-2-14
2. Draw a vertical line through the center of the space.	
3. Locate a point on the vertical line 1/2" above the directrix and label this point FOCUS.	
4. Construct a parabola in the vertical position.	. Figure 4-57
CAUTION: Figure 4-57 has the parabola in the horizontal position.	
5. Darken the parabola with the aid of an irregular curve.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw a Hyperbola

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-28

DRAWING NUMBER: 4-43

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a horizontal line through the center of the space.	. SC-4-23 . SC-2-14
2. Locate and label two points A and B on this line 1" apart near its center. (AB represents the transverse axis.)	. Figure 4-60
3. Locate foci points F and F' 1-1/2" apart.	. Figure 4-60
4. Construct a hyperbola about these points. CAUTION: Follow paragraph 4.61 carefully.	. Figure 4-60b
5. Draw the asymptotes.	
6. Darken hyperbola.	. Figure 4-60

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw a Sprial of Archimedes

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-29

DRAWING NUMBER: 4-45

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a horizontal and vertical line with their intersection near the center of the space.	. SC-4-24 . SC-2-14
2. Draw lines from the intersection point 30° apart.	. Figure 4-62
3. Construct one complete turn (360°) of Archimedes sprial with the generating point moving in a counterclockwise direction and away from the center 1" in one turn. CAUTION: Figure 4-62 shows the spiral going in a "clockwise" direction.	
4. Darken the spiral with the aid of an irregular curve.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw a Helix

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-30

DRAWING NUMBER: 4-46

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a horizontal line through the center of the space.	. SC-4-25
2. Draw a 2" diameter circle with its center on the line and to the left of the center of the space.	. SC-2-14
3. Construct a helix 2-1/2" long with a lead of 1" in the space to the right of the circle. CAUTION: The helix in Figure 4-63 is in the vertical position. Your helix is horizontal.	. Figure 4-63
4. Darken helix. CAUTION: Don't forget the hidden lines.	. Figure 4-63

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw an Involute of a Triangle

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-31

DRAWING NUMBER: 4-47

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw an equilateral triangle with 1/2" sides near the center of the space.	. SC-4-26
2. Construct one complete turn of an involute of the triangle.	. Figure 4-64b
3. Darken triangle and involute curve.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw an Involute of a Circle

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-32

DRAWING NUMBER: 4-48

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a 1-1/2" diameter circle near the center of the space.	. SC-4-26 . SC-2-14
CAUTION: Use the 1-1/2" circle instead of the 3/4" called for by the text.	. Figure 4-64d
2. Divide the circle every 15°.	
3. Construct an involute for the right side of the circle.	
4. Darken involute with the aid of an irregular curve.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw One View of a Rocker Arm

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-33

DRAWING NUMBER: 4-69

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout horizontal and vertical center lines.	
2. Draw those circles and arcs which have their centers located. CAUTION: Always use light construction lines until all lines are complete--including circles and arcs.	
3. Locate centers and tangent points for the remaining arcs.	
4. Draw those arcs.	
5. Draw the hex.	
6. Erase any unnecessary construction lines.	
7. Darken the view. CAUTION: Always darken arcs first. This makes it easier to form smooth connections with straight lines.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw One View of the Caliper
UNIT IV: Geometric Construction
COURSE: Mechanical Drafting
MATERIAL: A-Vellum
TOOLS: Standard tool kit
TEXT/REFERENCE:
Bibliography Number 1

JOB SHEET IDENTIFICATION CODE
JOB NUMBER: J-4-34
DRAWING NUMBER: 4-70

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout the horizontal and two vertical center lines.	. SC-4-17
2. Draw the arcs with their center given. CAUTION: Always use light construction lines until all lines are complete--this includes circles and arcs.	. SC-4-14
3. Locate the centers and tangent points for the remaining arcs.	
4. Draw those arcs.	
5. Draw the hex.	
6. Erase unnecessary construction lines.	
7. Darken the view. CAUTION: Always darken arcs first. This makes it easier to form smooth connections with straight lines.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw One View of a Special Cam

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-35

DRAWING NUMBER: 4-71

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout vertical and horizontal center lines.	
2. Construct an ellipse by any one of the three methods that you have used.	
CAUTION: Always use light construction lines until all lines are complete--this includes circles and arcs.	
3. Draw the remaining arcs and hex.	
4. Erase any unnecessary construction lines.	
5. Darken the view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw One View of a Shaft Hanger Casting

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-36

DRAWING NUMBER: 4-73

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Figure spacing of the view. NOTE: It is good practice to draw a rectangle that is to contain the view. You should have the same amount of open space above and below the rectangle.	. SC-5-2
2. Draw the arcs whose centers can be determined from specifications.	
3. Locate centers and tangent points of remaining arcs.	
4. Draw those arcs.	
5. Complete straight-line work.	
6. Erase unnecessary construction lines.	
7. Darken view. CAUTION: Darken arcs before straight lines.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw One View of a Shift Lever

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-37

DRAWING NUMBER: 4-74

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout all vertical and horizontal center lines.	
2. Draw the arcs whose centers are indicated by specification.	
3. Locate centers and tangent points of remaining arcs.	
4. Draw those arcs.	
5. Complete the layout.	
6. Erase unnecessary construction.	
7. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw One View of a Gear Arm

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-38

DRAWING NUMBER: 4-75

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout vertical, horizontal and circular center lines.	
2. Draw those arcs with centers that can be located from specifications.	
3. Locate centers and tangent points of remaining arcs.	
4. Draw remaining arcs.	
5. Erase any unnecessary construction.	
6. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw One View of a Form Roll Lever

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-39

DRAWING NUMBER: 4-76

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout vertical and horizontal center lines.	
2. Draw those arcs with centers that can be located from specifications.	
3. Locate centers and tangent points of remaining arcs.	
4. Draw remaining arcs.	
5. Complete layout.	
6. Erase unnecessary construction lines.	
7. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB:	Draw One View of a Special S-Wrench	**JOB SHEET IDENTIFICATION CODE**
UNIT IV:	Geometric Construction	JOB NUMBER: J-4-40
COURSE:	Mechanical Drafting	DRAWING NUMBER: 4-78
MATERIAL:	A-Vellum	
TOOLS:	Standard tool kit	

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout center lines.	. SC-4-18
2. Layout ogee curve.	. SC-4-12
3. Layout squares.	. SC-4-13
4. Layout pentagon.	. SC-2-13
5. Erase unnecessary construction.	
6. Darken view.	
NOTE: An ellipse template can be used to draw the small ellipse.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw One View of an Auto Headlight Reflector

UNIT IV: Geometric Construction

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-4-41

DRAWING NUMBER: 4-79

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Locate and draw foci and directrix.	. SC-4-22
2. Construct the parabola.	
3. Complete construction.	
4. Erase any unnecessary construction lines.	
5. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Three Views of a Stop Block

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-5-1

DRAWING NUMBER: 6-50-1

UNIT V: Multiview Projection

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Figure spacing of the three views.	
2. Layout front and right side view as given.	
NOTE: Draw the circle in the front view and project to right side view.	
3. Project all edges and corners from front and right side view to the top view.	
4. Complete top view.	
NOTE: If you have trouble visualizing the top view, use the numbering system to complete the view.	
5. Erase any unnecessary construction lines.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Three Views of a Holder

JOB SHEET IDENTIFICATION CODE

UNIT V: Multiview Projection

JOB NUMBER: J-5-2

COURSE: Mechanical Drafting

DRAWING NUMBER: 6-50-2

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Figure spacing of the three views.	
2. Layout front and right side view as given. NOTE: Omit hidden lines for drilled holes at this time. Never develop one view at a time--develop them together.	
3. Project all edges and corners from front and right side view to the top view.	
4. Complete the top view. NOTE: If you have trouble visualizing the top view, use the numbering system to complete the view.	
5. Project circle from top view to other views to complete hidden lines.	
6. Erase any unnecessary construction lines.	
7. Check the drawing.	
8. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Three Views of a Slide

UNIT V: Multiview Projection

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-5-3

DRAWING NUMBER: 6-50-3

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Figure the spacing of the three views.	. SC-5-2
2. Layout front and right side view.	. SC-5-4
NOTE: Omit hidden lines for holes at this time.	. SC-5-5
3. Project and complete the top view.	
4. Project circles from top view to other views to obtain hidden lines.	
5. Erase unnecessary construction and check for completeness.	
6. Darken the views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Three Views of a Terminal

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-5-4

DRAWING NUMBER: 6-50-4

UNIT V: Multiview Projection

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Figure spacing of the views.	. SC-5-2
2. Layout given views.	. SC-5-4
NOTE: Omit hidden lines for circles at this time.	. SC-5-5
3. Project and complete the front view.	
4. Project circles from front view to obtain hidden lines in other views.	
5. Check for completeness.	
6. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB:	Draw Three Views of a Base	**JOB SHEET IDENTIFICATION CODE**
UNIT V:	Multiview Projection	JOB NUMBER: J-5-5
COURSE:	Mechanical Drafting	DRAWING NUMBER: 6-50-5
MATERIAL:	A-Vellum	
TOOLS:	Standard tool kit	

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Figure spacing of the views.	. SC-5-2
2. Layout given views.	. SC-5-4
3. Project and complete the top view.	. SC-5-5
4. Check for completeness.	
5. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB:	Draw Three Views of a Wedge	JOB SHEET IDENTIFICATION CODE
UNIT V:	Multiview Projection	JOB NUMBER: J-5-6
COURSE:	Mechanical Drafting	DRAWING NUMBER: 6-50-6
MATERIAL:	A-Vellum	
TOOLS:	Standard tool kit	
TEXT/REFERENCE:		
	Bibliography Number 1	

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Figure spacing of the views.	. SC-5-2
2. Layout given views.	. SC-5-4
3. Project and complete the top view.	. SC-5-5
4. Check for completeness.	
5. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Three Views of a Vise Base

UNIT V: Multiview Projection

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-5-7

DRAWING NUMBER: 6-50-7

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Figure spacing of the views.	. SC-5-2
2. Layout given views.	. SC-5-4
3. Project and complete the top view.	. SC-5-5
4. Check for completeness.	
5. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB:	Draw Three Views of a Bracket	JOB SHEET IDENTIFICATION CODE
UNIT V:	Multiview Projection	JOB NUMBER: J-5-8
COURSE:	Mechanical Drafting	DRAWING NUMBER: 6-50-8
MATERIAL:	A-Vellum	
TOOLS:	Standard tool kit	

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Figure spacing of views.	. SC-5-2
2. Layout given views.	. SC-5-4
3. Project and complete side view.	. SC-5-5
4. Check for completeness.	
5. Darken the views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB:	Draw Three Views of a Locator	JOB SHEET IDENTIFICATION CODE
UNIT V:	Multiview Projection	JOB NUMBER: J-5-9
COURSE:	Mechanical Drafting	DRAWING NUMBER: 6-51-1
MATERIAL:	A-Vellum	
TOOLS:	Standard tool kit	

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Figure spacing of views.	. SC-5-2
2. Layout given views.	. SC-5-4
3. Project and complete side view.	. SC-5-5
4. Check for completeness.	
5. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Three Views of a V-Stop

UNIT V: Multiview Projection

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-5-10

DRAWING NUMBER: 6-51-2

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Figure spacing.	. SC-5-2
2. Layout given views.	. SC-5-4
3. Project and complete side view.	. SC-5-5
4. Check for completeness.	
5. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Three Views of a Bracket

UNIT V: Multiview Projection

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

- Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-5-11

DRAWING NUMBER: 6-51-3

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Figure spacing.	. SC-5-2
2. Layout given views.	. SC-5-4
3. Project and complete side view.	. SC-5-5
4. Check for completeness.	
5. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB:	Draw Three Views of an Angle Block	JOB SHEET IDENTIFICATION CODE
UNIT V:	Multiview Projection	JOB NUMBER: J-5-12
COURSE:	Mechanical Drafting	DRAWING NUMBER: 6-51-4
MATERIAL:	A-Vellum	
TOOLS:	Standard tool kit	
TEXT/REFERENCE:	Bibliography Number 1	

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Figure spacing.	. SC-5-2
2. Layout given views.	. SC-5-4
3. Project and complete side view.	. SC-5-5
4. Check for completeness.	
5. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Three Views of a Wedga Block

UNIT V: Multiview Projection

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-5-13

DRAWING NUMBER: 6-51-5

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Figure spacing.	. SC-5-2
2. Layout given views.	. SC-5-4
3. Project and complete side view.	. SC-5-5
4. Check for completeness.	
5. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Three Views of a Guide Finger

UNIT V: Multiview Projection

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET
IDENTIFICATION CODE

JOB NUMBER: J-5-14

DRAWING NUMBER: 6-52-2

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Figure spacing.	. SC-5-2
2. Layout given views.	. SC-5-4
3. Project and complete side view.	. SC-5-5
4. Check for completeness.	
5. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Three Views of a Rod Head

UNIT V: Multiview Projection

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-5-15

DRAWING NUMBER: 6-52-5

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Figure spacing.	. SC-5-2
2. Layout given views.	. SC-5-4
3. Project and complete top view.	. SC-5-5
4. Check for completeness.	
5. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Necessary Views of a Safety Key

UNIT V: Multiview Projection

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET
IDENTIFICATION CODE

JOB NUMBER: J-5-16

DRAWING NUMBER: 6-53

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine the necessary views.	. SC-5-1
2. Figure spacing.	. SC-5-2
3. Layout the views.	. SC-5-4
NOTE: Develop the views simultaneously.	. SC-5-5
4. Check for completeness.	
5. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Necessary Views of a Finger Guide

UNIT V: Multiview Projection

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-5-17

DRAWING NUMBER: 6-54

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine necessary views.	. SC-5-1
2. Figure spacing.	. SC-5-2
3. Layout the views.	. SC-5-4
4. Check for completeness.	. SC-5-5
5. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Necessary Views of a Tailstock Clamp

JOB SHEET IDENTIFICATION CODE

UNIT V: Multiview Projection

JOB NUMBER: J-5-18

COURSE: Mechanical Drafting

DRAWING NUMBER: 6-57

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine the necessary views.	. SC-5-1
2. Figure the spacing.	. SC-5-2
3. Layout the views.	. SC-5-4
4. Check for completeness.	. SC-5-5
5. Darken views. NOTE: Small radii (1/8" or less) can be darkened freehand.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleaniiness.
4. Line quality.
5. Time required.

JOB: Draw Necessary Views of a Cam

UNIT V: Multiview Projection

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-5-19

DRAWING NUMBER: 6-61

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine the necessary views.	. SC-5-1
2. Figure spacing.	. SC-5-2
3. Layout the views.	. SC-5-4
4. Check for completeness.	. SC-5-5
5. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB:	Draw Necessary Views of a Cut-Off Holder	JOB SHEET IDENTIFICATION CODE
UNIT V:	Multiview Projection	JOB NUMBER: J-5-20
COURSE:	Mechanical Drafting	DRAWING NUMBER: 6-67
MATERIAL:	A-Vellum	
TOOLS:	Standard tool kit	

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine necessary views.	. SC-5-1
2. Figure spacing.	. SC-5-2
3. Layout views.	. SC-5-4
4. Check for completeness.	. SC-5-5
5. Darken views. NOTE: Small fillets and rounds (1/8" or less) can be darkened freehand.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Necessary Views of a Frame Guide

UNIT V: Multiview Projection

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-5-21

DRAWING NUMBER: 6-69

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine the necessary views.	. SC-5-1
2. Figure the spacing.	. SC-5-2
3. Layout the views.	. SC-5-4
4. Check for completeness.	. SC-5-5
5. Darken the views. NOTE: Small fillets and rounds (1/8" or less) can be darkened freehand.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Necessary Views of a Cross-Feed Stop

UNIT V: Multiview Projection

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-5-22

DRAWING NUMBER: 6-74

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine necessary views.	. SC-5-1
2. Figure spacing.	. SC-5-2
3. Layout the views.	. SC-5-4
4. Check for completeness.	. SC-5-5
5. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Sketch Indicated Views and Add the Missing Lines

JOB SHEET IDENTIFICATION CODE

UNIT VI: Freehand Sketching

JOB NUMBER: J-6-1

COURSE: Mechanical Drafting

DRAWING NUMBER: 5-51-1,2,3,4

MATERIAL: B-Vellum

TOOLS: Standard tool kit (Use only pencil for this job.)

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Divide drawing space into four equal rectangular areas.	. SC-6-1
2. Estimate spacing of the first problem in the upper left-hand area.	
3. Layout the views freehand (lightly) in that area.	
NOTE: Be certain that all points are in projection.	
4. Check and erase unnecessary construction lines.	
5. Darken views freehand.	
6. Repeat the above procedure for the other three problems.	
NOTE: When more than one problem is assigned to one plate, always work from the top down--this helps to keep the drawing clean.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Sketch Indicated Views and Add the Missing Lines

UNIT VI: Freehand Sketching

COURSE: Mechanical Drafting

MATERIAL: B-Vellum

TOOLS: Standard tool kit (Use only pencil.)

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-6-2

DRAWING NUMBER: 5-51-5,6,7,8

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Divide drawing space into four equal rectangular areas.	. SC-6-1
2. Estimate spacing of the first problem in the upper left-hand area.	
3. Layout the views freehand (lightly) in that area. NOTE: Be certain that all points are in projection.	
4. Check and erase unnecessary construction.	
5. Darken the views freehand.	
6. Repeat the above procedure for the other three problems. NOTE: When more than one problem is assigned to one plate, always work from the top down--this helps to keep the drawing clean.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Sketch Indicated Views and Add The Missing Lines

UNIT VI: Freehand Sketching

COURSE: Mechanical Drafting

MATERIAL: B-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-6-3

DRAWING NUMBER: 5-51-9, 10, 12, 13

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Divide drawing space into four equal rectangular areas.	. SC-6-1
2. Estimate spacing of the first problem in the upper left-hand area.	
3. Layout the views freehand (lightly) in that area.	
4. Check and erase any unnecessary construction lines.	
5. Darken views freehand.	
6. Repeat the above procedure for the other three problems.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Sketch Indicated Views and Add Missing Lines

UNIT VI: Freehand Sketching

COURSE: Mechanical Drafting

MATERIAL: B-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-6-4

DRAWING NUMBER: 5-52-2,3,5,6

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Divide drawing space into four equal rectangular areas.	. SC-6-1
2. Estimate spacing of the first problem in the upper left-hand area.	
3. Layout the views freehand (lightly) in that area.	
4. Check and erase any unnecessary construction lines.	
5. Darken views freehand.	
6. Repeat the above procedure for the other three problems.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Sketch Indicated Views and Add Missing Lines

UNIT VI: Freehand Sketching

COURSE: Mechanical Drafting

MATERIAL: B-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-6-5

DRAWING NUMBER: 5-52-12, 16, 24

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Divide drawing space into four equal rectangular areas.	
2. Estimate spacing of the first problem in the upper left-hand area.	
3. Layout the views freehand (lightly) in that area.	
4. Check and erase any unnecessary construction lines.	
5. Darken views freehand.	
6. Repeat the above procedure for the other three problems.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Full Section and Other Necessary Views of the Bearing

UNIT VIII: Sectional Views

COURSE: Mechanical Drafting

MATERIAL: B-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-8-1

DRAWING NUMBER: 7-39

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine necessary views.	. SC-5-1
2. Figure spacing.	. SC-5-2
3. Layout views.	. SC-5-4
4. Check and erase unnecessary construction lines.	
5. Darken views.	
6. Draw section lines. NOTE: Use section line symbols for cast iron.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Half Section and Other Necessary Views of the Truck Wheel

UNIT VIII: Sectional Views

COURSE: Mechanical Drafting

MATERIAL: B-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-8-2

DRAWING NUMBER: 7-40

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine necessary views.	. SC-5-1
2. Figure spacing.	. SC-5-2
3. Layout views.	. SC-5-4
4. Check and erase unnecessary construction lines.	
5. Darken views.	
6. Add section lines.	
NOTE: Use section line symbols for cast iron.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Full Section Through Rib and Other Necessary Views of the Column Support

UNIT VIII: Sectional Views

COURSE: Mechanical Drafting

MATERIAL: B-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-8-3

DRAWING NUMBER: 7-41

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine necessary views.	. SC-5-1
2. Figure spacing.	. SC-5-2
3. Layout views.	. SC-5-4
4. Check and erase any unnecessary construction lines.	
5. Darken views.	
6. Add section lines.	
NOTE: Use alternate section lining for the rib.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Full Section and Revolve Holes To Cutting Plane of a Special Bearing

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-8-4

DRAWING NUMBER: 7-43

UNIT VIII: Sectional Views

COURSE: Mechanical Drafting

MATERIAL: B-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine necessary views.	. SC-5-1
2. Figure spacing.	. SC-5-2
3. Layout views.	. SC-5-4
4. Check and erase unnecessary construction lines.	
5. Darken views.	
6. Draw section lines.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB:	Draw Full Section and Revolve Rib to Cutting Plane of a Pulley	JOB SHEET IDENTIFICATION CODE
UNIT VIII:	Sectional Views	JOB NUMBER: J-8-5
COURSE:	Mechanical Drafting	DRAWING NUMBER: 7-49
MATERIAL:	B-Vellum	
TOOLS:	Standard tool kit	

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine necessary views.	. SC-5-1
2. Figure spacing.	. SC-5-2
3. Layout views.	. SC-5-4
4. Check and erase unnecessary construction.	. Figure 7-31 when drawing the spokes
5. Darken views.	
6. Draw section lines.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Necessary Views Including a Revolved Section of the Dash Pot Lifter

JOB SHEET IDENTIFICATION CODE

UNIT VIII: Sectional Views

JOB NUMBER: J-8-6

COURSE: Mechanical Drafting

DRAWING NUMBER: 7-54

MATERIAL: B-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine necessary views.	. SC-5-1
2. Figure spacing.	. SC-5-2
3. Layout views.	. SC-5-4
4. Check and erase unnecessary construction lines.	. Figure 7-15
5. Darken views.	
6. Add section lines to the revolved section.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Necessary Views and Offset Sections of the Adjuster Base

UNIT VIII: Sectional Views

COURSE: Mechanical Drafting

MATERIAL: B-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-8-7

DRAWING NUMBER: 7-55

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine necessary views.	. SC-5-1
2. Figure spacing.	. SC-5-2
3. Layout views.	. SC-5-4
4. Check and erase any unnecessary construction lines.	. Figure 7-24
5. Darken views.	
6. Add section lines.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB SHEET
IDENTIFICATION CODE

JOB NUMBER: J-9-1

DRAWING NUMBER: 8-29-1

JOB: Draw Auxiliary View Using Folding Line Method

UNIT IX: Auxiliary Views

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Figure spacing.	. SC-9-1
NOTE: Be careful that the auxiliary view does not fall between front and right side view.	. SC-9-2
2. Layout front and right side view.	
3. Project lines perpendicular to the sloping surface of the front view.	. Figure 8-2
4. Transfer depth measurements from side view to auxiliary view with dividers.	
5. Complete layout of auxiliary view.	
6. Check and erase unnecessary construction lines.	
7. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Auxiliary View Using Folding Line Method

UNIT IX: Auxiliary Views

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-9-2

DRAWING NUMBER: 8-29-4

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Figure spacing.	. SC-9-1
2. Layout front and right side view.	. SC-9-3
3. Project lines perpendicular to the sloping surface of the front view.	. SC-9-2
4. Transfer depth measurements from side view to auxiliary view with dividers.	
5. Complete layout of auxiliary view.	
6. Check and erase unnecessary construction.	
7. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Auxiliary View Using Reference Line Method

UNIT IX: Auxiliary Views

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-9-3

DRAWING NUMBER: 8-29-5

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Estimate spacing.	. SC-9-4
2. Layout front and right side view.	. SC-2-9
3. Establish reference plan in side and auxiliary view.	. SC-2-10
NOTE: Use center line for reference plane on cylindrical objects.	. Figure 8-6
4. Divide side view into 15° segments.	
5. Project points from side view to front view.	
6. Project points from front view to auxiliary view.	
7. Transfer horizontal measurements from side view to auxiliary view.	
8. Use irregular curve to connect points in auxiliary view.	
9. Check and erase unnecessary construction.	
10. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Auxiliary View Using Reference Line Method

UNIT IX: Auxiliary Views

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-9-4

DRAWING NUMBER: 8-29-7

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Estimate spacing.	. SC-9-4
2. Layout front and right side views.	
3. Establish reference planes.	. Figure 8-6
4. Project points from side view to front view.	
5. Project points perpendicular to sloping surface.	
6. Transfer horizontal measurements from side view to auxiliary view.	
7. Complete auxiliary view by connecting points.	
8. Check and erase unnecessary construction.	
9. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Auxiliary View Using Reference Line Method

UNIT IX: Auxiliary Views

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-9-5

DRAWING NUMBER: 8-29-10

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Estimate spacing.	. SC-9-4
2. Layout front and right side view.	
3. Establish reference lines.	. Figure 8-6
4. Divide 1-1/2" arc on right side view every 15°.	
5. Project these points to front view.	
6. Project points perpendicular to front view.	
7. Transfer horizontal measurements from side view to auxiliary view.	
8. Complete auxiliary view by connecting points.	
9. Check and erase unnecessary construction.	
10. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Auxiliary View Using Reference Line Method

UNIT IX: Auxiliary Views

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-9-6

DRAWING NUMBER: 8-29-14

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Estimate spacing.	. SC-9-4
2. Layout front and right side view.	
3. Establish reference lines.	. Figure 8-6
4. Divide 1-1/2" arc on side view every 15°.	
5. Project these points to front view.	
6. Project points perpendicular to front view.	
7. Transfer horizontal measurements from side view to auxiliary view.	
8. Complete auxiliary view by connecting points.	
9. Check and erase unnecessary construction.	
10. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Auxiliary View Using Reference Line Method

UNIT IX: Auxiliary Views

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-9-7

DRAWING NUMBER: 8-29-19

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Estimate spacing.	. SC-9-4
2. Layout front and right side view.	
3. Establish reference lines.	
4. Project all edges and surfaces from side view to front view.	
5. Project perpendicular to front view.	
6. Transfer horizontal measurements from side view to auxiliary view.	
7. Complete layout of auxiliary by connecting points.	
8. Check and erase unnecessary construction.	
9. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB SHEET
IDENTIFICATION CODE

JOB NUMBER: J-9-8

DRAWING NUMBER: 8-30

JOB: Draw Partial Auxiliary and Regular Views of the Anchor Bracket

UNIT IX: Auxiliary Views

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine necessary views and partial views.	
2. Determine spacing of views. NOTE: Remember that an auxiliary view is drawn to show the "true" shape of some part of the object.	
3. Layout the views. NOTE: If the arcs show as true radii in the auxiliary, they should be drawn in the auxiliary view first and then projected to the regular views.	
4. Check and erase unnecessary construction.	
5. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Necessary Partial Auxiliary and Regular Views of the Guide Bracket

UNIT IX: Auxiliary Views

COURSE: Mechanical Drafting

MATERIAL: B-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-9-9

DRAWING NUMBER: 8-35

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine necessary views and partial views. NOTE: Remember that an auxiliary view is drawn to show the "true" shape of some part of the object. 2. Determine spacing of views. 3. Layout the views. 4. Check and erase unnecessary construction. 5. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Necessary Views of the Control Bracket

UNIT IX: Auxiliary Views

COURSE: Mechanical Drafting

MATERIAL: B-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

<ins>JOB SHEET IDENTIFICATION CODE</ins>

JOB NUMBER: J-9-10

DRAWING NUMBER: 8-41

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine necessary views.	
2. Determine spacing of the views.	
3. Layout the views.	
4. Check and erase unnecessary construction.	
5. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB:	Draw Necessary Views of the Drill Press Bracket	**JOB SHEET IDENTIFICATION CODE**
UNIT IX:	Auxiliary Views	JOB NUMBER: J-9-11
COURSE:	Mechanical Drafting	DRAWING NUMBER: 8-45
MATERIAL:	B-Vellum	
TOOLS:	Standard tool kit	

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine necessary views. 2. Determine spacing of views. 3. Layout the views. NOTE: The auxiliary view should be drawn from specifications and then projected back to the top and front views. To complete front view, transfer measurements from the auxiliary view to the front view. 4. Check and erase unnecessary construction. 5. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Secondary Auxiliary View of the Dovetail Slide

JOB SHEET IDENTIFICATION CODE

UNIT IX: Auxiliary Views

JOB NUMBER: J-9-12

COURSE: Mechanical Drafting

DRAWING NUMBER: 8-53

MATERIAL: B-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine necessary views. NOTE: Remember that a secondary auxiliary view requires two auxiliary views.	. SC-9-5
2. Determine spacing of views. NOTE: Do this by blocking in the views and shift them if necessary to obtain the correct spacing. The first auxiliary view should be projected perpendicular to edge 2-3.	
3. Layout the views. NOTE: The reference line method works best here. When the secondary auxiliary view is completed, the depth and width of the dovetail can be projected back to the other views. The secondary auxiliary view should just be of surface 1-2-3-4.	
4. Check and erase unnecessary construction.	
5. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB:	Revolve the Prism
UNIT X:	Revolutions
COURSE:	Mechanical Drafting
MATERIAL:	B-Vellum
TOOLS:	Standard tool kit
TEXT/REFERENCE:	Bibliography Number 1

JOB SHEET
IDENTIFICATION CODE

JOB NUMBER: J-10-1

DRAWING NUMBER: 9-15

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Divide plate into four areas and number them.	. Figure 9-15 . SC-10-1
2. Layout the block as shown in space I. NOTE: Omit dimensions but number each corner as shown.	
3. Revolve the front view 30^{0} and place it in space II as shown.	
4. Project from front view to top and right side positions.	
5. Obtain depth for top view by projecting from the top view in space I.	
6. Project depth to right side view.	. Figure 9-14
7. Number the corners the same as in space I.	
8. Complete the views by connecting the numbers in the same order as in space I.	
9. Darken the views.	
10. Revolve the side view in space II 15^{0} and place it in space III as shown.	
11. Project from the side view to front and top positions.	
12. Project from the front view of space II to the front and top position in space III.	

COMPETENCE - PROCEDURES/STEPS	TEACHING/LEARNING ACTIVITIES
13. Number the corners.	
14. Complete the views by connecting the points in their correct order.	
15. Darken the views.	
16. Revolve the side view in space III 15^{0} and place it in space IV as shown.	
17. Project from top view to front and side positions.	
18. Project from front view of space III to front and side positions in space IV.	
19. Number the corners.	
20. Complete the views by connecting the points.	
21. Darken the views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Revolve the Block

UNIT X: Revolutions

COURSE: Mechanical Drafting

MATERIAL: B-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET
IDENTIFICATION CODE

JOB NUMBER: J-10-2

DRAWING NUMBER: 9-16a

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Divide plate into four areas and number them.	. Figure 9-15
2. Layout the front, top and side view of Figure 16a in space I. NOTE: Omit dimensions but number each corner.	. SC-10-1
3. Revolve the front view 30° and place it in space II.	
4. Project from front view to top and side positions.	
5. Obtain depth for top view by projecting from the top view in space I.	
6. Project depth to right side view.	. Figure 9-14
7. Number the corners the same as in space I.	
8. Complete the views by connecting the numbers in the same order as in space I.	
9. Darken the views.	
10. Revolve the side view in space II 15° and place it in space III.	
11. Project from the side view to front and top positions.	

COMPETENCE - PROCEDURES/STEPS	TEACHING/LEARNING ACTIVITIES
12. Project from the front view of space II to the front and top position in space III.	
13. Number the corners.	
14. Complete the views by connecting the points in the correct order.	
15. Darken the views.	
16. Revolve the side view in space III 15° and place it in space IV.	
17. Project from the top view to front and side positions.	
18. Project from the front view of space III to the front and side positions in space IV.	
19. Number the corners.	
20. Complete the views by connecting the points.	
21. Darken the views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Revolve the Block
UNIT X: Revolutions
COURSE: Mechanical Drafting
MATERIAL: B-Vellum
TOOLS: Standard tool kit
TEXT/REFERENCE:
Bibliography Number 1

JOB SHEET IDENTIFICATION CODE
JOB NUMBER: J-10-3
DRAWING NUMBER: 9-16c

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Divide plate into four areas and number them.	. Figure 9-15
2. Layout the front, top and side view of Figure 16c in space I. NOTE: Omit dimensions but number each corner.	. SC-10-1
3. Revolve the front view 30° and place it in space II.	
4. Project from front view to top and side positions.	
5. Obtain depth for top view by projecting from the top view in space I.	
6. Project depth to right side view.	. Figure 9-14
7. Number the corners the same as in space I.	
8. Complete the views by connecting the numbers in the same order as in space I.	
9. Darken the views.	
10. Revolve the side view in space II 15° and place it in space III.	
11. Project from the side view to front and top positions.	

COMPETENCE - PROCEDURES/STEPS	TEACHING/LEARNING ACTIVITIES
12. Project from the front view of space II to the front and top position in space III.	
13. Number the corners.	
14. Complete the views by connecting the points in their correct order.	
15. Darken the views.	
16. Revolve the side view in space III 15° and place it in space IV.	
17. Project from the top view to front and side positions.	
18. Project from the front view of space III to the front and side positions in space IV.	
19. Number the corners.	
20. Complete the views by connecting the points.	
21. Darken the views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Revolve the Pyramid

UNIT X: Revolutions

COURSE: Mechanical Drafting

MATERIAL: B-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-10-4

DRAWING NUMBER: 9-16

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Divide plate into four areas and number them.	. Figure 9-15
2. Layout the front, top and side view of Figure 16f in space I.	. SC-10-1
NOTE: Omit dimensions but number each corner.	
3. Revolve the front view 30° and place it in space II.	
4. Project from front view to top and side positions.	
5. Obtain depth for top view by projecting from the top view in space I.	
6. Project depth to right side.	. Figure 9-14
7. Number the corners the same as in space I.	
8. Complete the views by connecting the numbers in the same order as in space I.	
9. Darken the views.	
10. Revolve the side view in space II 15° and place it in space III.	
11. Project from the side view to front and top positions.	

COMPETENCE - PROCEDURES/STEPS	TEACHING/LEARNING ACTIVITIES
12. Project from the front view of space II to the front and top position in space III.	
13. Number the corners.	
14. Complete the views by connecting the points in their correct order.	
15. Darken the views.	
16. Revolve the side view in space III 15° and place it in space IV.	
17. Project from the top view to front and side positions.	
18. Project from the front view of space III to the front and side positions in space IV.	
19. Number the corners.	
20. Complete the views by connecting the points.	
21. Darken the views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Isometric of the Key Plate

UNIT XI: Axonometric and Oblique

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET
IDENTIFICATION CODE

JOB NUMBER: J-11-1

DRAWING NUMBER: 16-51-1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Locate and draw the isometric axes.	. Figure 16-9
2. Construct a rectangular solid that will enclose the key plate.	. Figure 16-6I
	. SC-11-1
NOTE: Measurements can only be made parallel to the isometric axes.	
3. Complete the isometric view by drawing the key plate inside the rectangular solid.	
4. Check and erase unnecessary construction.	
5. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality
5. Time required.

JOB:	Draw Isometric of the Strap
UNIT XI:	Axonometric and Oblique
COURSE:	Mechanical Drafting
MATERIAL:	A-Vellum
TOOLS:	Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-11-2

DRAWING NUMBER: 16-51-3

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Locate and draw isometric axes.	. Figure 16-9
2. Construct a rectangular solid that will enclose the strap. NOTE: Measurements can only be made parallel to the isometric axes.	. Figure 16-61 . SC-11-1
3. Layout the straight lines of the strap inside the solid.	
4. Layout the construction lines for the holes in the strap.	. Figure 16-24 and 16-26
5. Check and erase unnecessary construction.	
6. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Isometric of the Bracket

UNIT XI: Axonometric and Oblique

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-11-3

DRAWING NUMBER: 16-51-4

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine the best position for the axis.	. Figure 16-9 . SC-11-1 . SC-11-2
2. Locate and draw the axis.	
3. Construct a rectangular solid that will enclose the bracket.	
4. Layout the bracket inside the solid. NOTE: Measurements can only be made parallel to the axis.	
5. Layout the construction lines for the holes.	. Figure 16-26
6. Check and erase unnecessary construction.	
7. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Isometric of the Cutter Block
UNIT XI: Axonometric and Oblique
COURSE: Mechanical Drafting
MATERIAL: A-Vellum
TOOLS: Standard tool kit
TEXT/REFERENCE:
Bibliography Number 1

JOB SHEET IDENTIFICATION CODE
JOB NUMBER: J-11-4
DRAWING NUMBER: 16-51-5

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw long axis horizontal near the center of the plate.	. Figure 16-9d and 16-11
2. Layout rectangular solid that will enclose the cutter block.	. SC-11-1
3. Layout the cutter block inside the solid. NOTE: Measurements can only be made parallel to axis.	. SC-11-2
4. Layout the construction for the holes.	
5. Check and erase unnecessary construction.	
6. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Isometric of the House Model

UNIT XI: Axonometric and Oblique

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-11-5

DRAWING NUMBER: 16-51-7

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout axis in proper position.	. Figure 16-9a
2. Layout the house model. NOTE: Place point "A" at the center of the axis. Remember that nonisometric (sloping) lines can be drawn by locating their end points and connecting them.	. SC-11-1
3. Check and erase unnecessary construction.	
4. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Isometric of the Guide Block
UNIT XI: Axonometric and Oblique
COURSE: Mechanical Drafting
MATERIAL: A-Vellum
TOOLS: Standard tool kit
TEXT/REFERENCE:
Bibliography Number 1

JOB SHEET IDENTIFICATION CODE
JOB NUMBER: J-11-6
DRAWING NUMBER: 16-51-8

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout axis in proper position.	. Figure 16-9a
2. Layout the guide block. NOTE: Place point "A" at the center of the axis. Remember that nonisometric (sloping) lines can be drawn by locating their end points and connecting them.	. SC-11-1
3. Check and erase unnecessary construction.	
4. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Isometric of the Tailstock Clamp

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-11-7

DRAWING NUMBER: 16-52-2

UNIT XI: Axonometric and Oblique

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout axis in proper position.	. Figure 16-9a.
2. Layout the tailstock clamp. NOTE: When angles are involved, it is helpful to layout the regular orthographic views on another sheet and transfer the end points of the sloping lines to the isometric drawing.	. SC-11-1
3. Check and erase unnecessary construction.	
4. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB:	Draw Isometric of the Table Support	JOB SHEET IDENTIFICATION CODE
UNIT XI:	Axonometric and Oblique	JOB NUMBER: J-11-8
COURSE:	Mechanical Drafting	DRAWING NUMBER: 16-52-3
MATERIAL:	A-Vellum	
TOOLS:	Standard tool kit	

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout axis in proper position.	. Figure 16-9a
2. Place point "A" at the center of the axis.	. SC-11-1
3. Layout the table support.	
4. Check and erase unnecessary construction.	
5. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Isometric of the Intersection

UNIT XI: Axonometric and Oblique

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-11-9

DRAWING NUMBER: 16-52-5

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout the axis in proper position.	. Figure 16-9a
2. Place point "A" at the center of the axis.	. SC-11-1
3. Layout the outline of the object.	
4. Determine the line of intersection. NOTE: This can best be accomplished by drawing the front and top views on another sheet and transferring the intersecting points to the auxiliary view.	
5. Check and erase unnecessary construction.	
6. Darken views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Isometric of the Control Block

UNIT XI: Axonometric and Oblique

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-11-10

DRAWING NUMBER: 16-52-6

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout axis in proper position.	. Figure 16-9a
2. Place point "A" at the center of the axis.	. SC-11-1
3. Layout the outline of the object.	
NOTE: Use the regular orthographic views to determine the location and length of the nonisometric lines.	
4. Check and erase unnecessary construction.	
5. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Isometric Half Section of the Hex Cap

UNIT XI: Axonometric and Oblique

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-11-11

DRAWING NUMBER: 16-52-8

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout the axis in proper position.	. Figure 16-9c
2. Place the center (point A) at the center of the axis.	
3. Layout the entire exterior of the hex cap.	
4. Draw the lines representing the cut surfaces.	. Figure 16-37
NOTE: Only a quarter of the object is removed for a half section.	. Figure 7-12
5. Complete the interior of the hex cap.	
6. Check and erase unnecessary construction.	
7. Add section lines.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Isometric of the Book End

UNIT XI: Axonometric and Oblique

COURSE: Mechanical Drafting

MATERIAL: B-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-11-12

DRAWING NUMBER: 16-52-9

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Divide the plate in half with a vertical line.	. SC-11-3
2. In the left space, layout the regular orthographic view showing the irregular curve and the grid used to construct it.	. SC-11-1
3. Layout the axis for the isometric drawing in the right hand space.	. Figure 16-9a
4. Layout the book end, omitting the rib.	
5. Transfer the 1/2" grid from the orthographic view to the isometric view where the rib is to be constructed.	
6. Construct the front curve in the grid with an irregular curve.	
7. Construct the back curve by projecting the points used for the front curve parallel to the depth axis and lay off the rib width on these projections.	
8. Check and erase unnecessary construction.	
9. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Oblique View of the Rod Guide

UNIT XI: Axonometric and Oblique

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-11-13

DRAWING NUMBER: 17-23-1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout the oblique axis. NOTE: Use an angle of 30° above the horizontal and sloping to the right for the receding axis.	. Figure 17-5 . SC-11-14 . SC-11-5
2. Locate the centers on the front plane for all radii the same as you would for a regular orthographic view.	
3. Draw the circles that are on the front plane.	
4. Project the centers of the remaining circles and arcs parallel to the receding axis until the desired plan is reached.	
5. Draw the remaining circles and arcs on their respective planes.	
6. Complete the straight-line work. NOTE: Tangent points are determined the same way as the regular orthographic drawing.	
7. Check and erase unnecessary construction.	
8. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB SHEET
IDENTIFICATION CODE

JOB NUMBER: J-11-14

DRAWING NUMBER: 17-23-3

JOB: Draw Oblique View of the Follower

UNIT XI: Axonometric and Oblique

COURSE: Mechanical Drafting

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout the oblique axis. NOTE: Use an angle of 45° above the horizontal and sloping to the right for the receding axis.	. Figure 17-5 . SC-11-4 . SC-11-5
2. Locate the centers on the front plane for all radii the same as you would for a regular orthographic view.	
3. Draw the circle that is on the frontal plane.	
4. Project the remaining centers parallel to the receding axis until the desired plane is reached.	
5. Draw the remaining circles and arcs on their respective planes.	
6. Complete the straight-line work. NOTE: Tangent points are determined the same way as for regular orthographic views.	
7. Check and erase unnecessary construction.	
8. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB SHEET
IDENTIFICATION CODE

JOB NUMBER: J-11-15

DRAWING NUMBER: 17-23-6

JOB:	Draw Oblique View of the Gland
UNIT XI:	Axonometric and Oblique
COURSE:	Mechanical Drafting
MATERIAL:	A-Vellum
TOOLS:	Standard tool kit
TEXT/REFERENCE:	Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout the axis.	. SC-11-4
NOTE: Use an angle of 30° above the horizontal and sloping to the right for the receding axis.	. SC-11-5
2. Locate the centers for all radii on the frontal plane.	
3. Draw the circle that is on the frontal plane.	
4. Project the remaining centers parallel to the receding axis until the desired plane is reached.	
5. Draw the remaining circles and arcs on their respective planes.	
6. Complete the straight-line work.	
7. Check and erase unnecessary construction.	
8. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB:	Draw Oblique View of the Control Arm	**JOB SHEET IDENTIFICATION CODE**	
UNIT XI:	Axonometric and Oblique	JOB NUMBER:	J-11-16
COURSE:	Mechanical Drafting	DRAWING NUMBER:	17-23-7
MATERIAL:	A-Vellum		
TOOLS:	Standard tool kit		

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout axis with receding axis 30° above the horizontal and sloping to the right.	. SC-11-4
2. Locate the centers for all radii on the frontal plane.	. SC-11-5
3. Draw the circle that is on the frontal plane.	
4. Project remaining centers to their respective planes.	
5. Draw the remaining circles and arcs.	
6. Complete the straight-line work.	
7. Check and erase unnecessary construction.	
8. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Oblique Half Section of the Step Cone

JOB SHEET IDENTIFICATION CODE

UNIT XI: Axonometric and Oblique

JOB NUMBER: J-11-17

COURSE: Mechanical Drafting

DRAWING NUMBER: 17-23-9

MATERIAL: A-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout axis.	. SC-11-4
NOTE: Select the axis that you feel appropriate.	. SC-11-5
2. Layout the centers.	
3. Draw the circles and complete the layout.	
4. Remove the section.	. Figure 17-20
5. Check and erase unnecessary construction.	
6. Darken views.	
7. Add section lines.	. Figure 17-20 NOTE: Pay particular attention to the direction of the section lines.

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

JOB: Draw Oblique View of the Angle Bearing

UNIT XI: Axonometric and Oblique

COURSE: Mechanical Drafting

MATERIAL: B-Vellum

TOOLS: Standard tool kit

TEXT/REFERENCE:

Bibliography Number 1

JOB SHEET IDENTIFICATION CODE

JOB NUMBER: J-11-18

DRAWING NUMBER: 17-23-10

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Divide the plate in half with a vertical line.	. SC-11-4
2. Layout the regular orthographic views as given, in the left half.	. SC-11-6
3. Divide the arc into 15° segments.	
4. Project these segments to the side view.	
5. Layout the oblique axis in the right half.	
NOTE: Select your own axis.	
6. Layout the irregular curve by the use of offset measurements.	. Figure 17-18
7. Complete the remaining layout.	
8. Check and erase unnecessary construction.	
9. Darken view.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Cleanliness.
4. Line quality.
5. Time required.

OPERATION SHEET
SC-2-1

COMPETENCY: Align and Fasten the Plate to the Board

COURSE: Mechanical Drafting UNIT II: Use and Care of Instruments

OBJECTIVE: To develop skill in fastening drawings to board to prevent damage from instruments.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Locate and align the sheet in the desired position with the aid of the parallel bar or drafting machine. This may be accomplished by placing the bar or machine parallel with the bottom edge of the sheet.	. IL-2-4
2. Hold the sheet with the left hand near its center and place a 1" piece of tape over the top corners.	
3. Lower the bar or machine and place a 1" piece of tape over the bottom corners.	
4. Check to see if the sheet lies flat on the drawing board.	
5. Should the sheet not lay flat, lift one or two of the corners and relocate the corners until the sheet remains flat.	NOTE: The sheet must lay flat or it may be torn by the bar or machine.

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.

OPERATION SHEET
SC-2-2

COMPETENCY: Layout Plate Border and Title Block

COURSE: Mechanical Drafting UNIT II: Use and Care of Instruments

OBJECTIVE: To layout and draw title blocks that provide space for identifying the company, designer, scale, date, part name and drawing number.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Measure 1/2" up from bottom edge and 1/2" down from the top edge.	
2. Draw light, horizontal lines through these points the full length of the sheet.	
3. Measure 1/2" in from each side and draw light vertical lines through these points the full width of the sheet.	
4. Complete the layout.	. Figure VII, Form 4
	NOTE: The title block and border should be layed out completely with light lines, then darken the required lines as indicated.

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-2-3

COMPETENCY: Use the Parallel Bar and Drafting Machine

COURSE: Mechanical Drafting UNIT II: Use and Care of Instruments

OBJECTIVE: To use a parallel bar to draw horizontal lines. The bar is controlled by a system of cords and pulleys which permit it to be moved up and down on the board while maintaining a horizontal position. The parallel bar is used as a guide for triangles and lettering devices. The drafting machine is used much in industry because it saves time by combining the functions of the parallel bar, scale, triangles and protractor. It is controlled by a series of bands which maintain the scale in a horizontal position--or any other desired position.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Grasp the bar with the left hand. Lift slightly, and move it to the desired position.	. IL-2-7
2. Press the bar lightly against the board with the left hand to maintain that position while you draw the line with the right hand.	
3. Place a triangle against the upper edge of the bar and hold it in place with the tips of the fingers while you apply pressure to the bar with the palm of the hand.	
4. Draw horizontal and inclined lines along the edges of the triangle.	
5. Grasp the dividing head of the drafting machine with the left hand, lift until the scales clear the board and move it to the desired position with the left hand.	
6. Once in position, press the scale against the drawing with the left hand and make the lines with the right hand.	NOTE: Some machines can be held in position with the left hand on the dividing head. Other machines require that you shift the left hand from the dividing head to the scale to hold it in the drawing position.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
7. Draw some inclined lines by adjusting the dividing head to the desired position.	NOTE: The machine is provided with automatic stops each 15 degrees. Any other setting requires that the dividing head be locked into position with the thumb lever.

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-2-4

COMPETENCY: Draw Construction Lines

COURSE: Mechanical Drafting UNIT II: Use and Care of Instruments

OBJECTIVE: To develop skill in layout and use of construction lines.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Using your 6H pencil, sharpened to a fine point, layout the octagon. NOTE: Sharpen a 6H point to use in the compass.	. Figure 4-28 . IL-2-11
2. When the view is complete, look it over and decide on which lines are not necessary for the finished octagon.	
3. Erase these lines.	
4. With the 2H pencil, darken the lines of the octagon.	NOTE: Consider the amount of difficult erasing if you would have used the 2H pencil to draw the construction lines.

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-2-5

COMPETENCY: Erase Properly

COURSE: Mechanical Drafting UNIT II: Use and Care of Instruments

OBJECTIVE: To develop skill in erasing procedures. Erasing saves time because it allows us to make changes without starting over. Erasing makes it easy to change the design and make revisions.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Select the slot in the erasing shield that best fits the line you want to erase.	. IL-2-11
2. Place the slot of the shield over the line to be erased and hold down firmly with the left hand.	NOTE: The shield has two functions. It allows you to erase without disturbing adjacent lines, and it holds the paper in place for erasing.
3. With the eraser in the right hand, press it over the appropriate slot and move it back and forth parallel with the slot.	NOTE: Apply light pressure at first and gradually increase it until you get the desired result.
4. Brush the erasings off the drawing with the drafting brush.	NOTE: Never use your hands because this will smear the remaining lines.
5. Erase the remaining indicated lines.	

METHOD OF EVALUATION:

1. Neatness.

OPERATION SHEET
SC-2-6

COMPETENCY: Use and Maintain Pencil Points

COURSE: Mechanical Drafting UNIT II: Use and Care of Instruments

OBJECTIVE: To develop skill in sharpening and maintaining a correct pencil point for line width control.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Sharpen the unlettered end of the 2H pencil.	. Figure 2-12, IL-2-5, 6
2. Clean the point with a paper towel.	NOTE: Several other items can be used for cleaning, such as a small piece of styrofoam sponge, or cloth.
3. Draw a line freehand on a sheet of scrap paper to check line width.	. Figure 2-15 NOTE: If the line width does not correspond to the desired width, small adjustments in the point can be made by rubbing the point on scrap paper.
4. Slope the pencil approximately 60° to the paper and in the direction you want to draw. As you make the line, the pencil should be rotated slowly. This will distribute the wear on the point and reduce the amount of sharpening.	
5. Frequent dressing of the point on scrap paper will help you to maintain the proper line width.	
6. Some new mechanical pencils are available that need no sharpening. That is, the lead diameter corresponds with the desired line width. On these pencils it is not necessary to rotate the pencil.	
7. Use three pencils for making drawings, a 2H for visible lines and lettering, a 3H for hidden and dimension lines, and a 4H or 5H for making guidelines and construction lines.	

METHOD OF EVALUATION:

1. Selection of pencils.
2. Proper sharpening.

OPERATION SHEET
SC-2-7

COMPETENCY: Use the Architect's Scale

COURSE: Mechanical Drafting UNIT II: Use and Care of Instruments

OBJECTIVE: To learn the various sections of the architect's scale and correct use of each scale.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. The full-size scale had a "16" at one end indicating that each inch is divided into 16 parts of 1/16 of an inch. Measurements less than 1/16, such as 1/32 and 1/64, are merely estimated between the 1/16 marks.	. IL-2-14
2. To make half-size measurements, use the full scale but consider 1/12 inch as 1 inch and each 1/16" as 1/8".	CAUTION: Do not use the 1/2" scale as this scale is designed to measure 1/2" as being equal to one foot.
3. To make a quarter-size measurement, use the scale with a "3" at the end (3 being 1/4 of 12). The calibrated area represents one foot compressed 3 inches, and is divided into inches and parts of an inch. To make measurements over 12", set the right end of the measurement on the foot mark that allows the other end of the measurement fall in the calibrated area (to the left of "0"). The answer then is read in feet and inches.	. Figure 2-36
4. Measurements for the remaining scales are made at the end of the scale represents the number of inches that one foot is compressed to. The only changes that occur is that when the scale changes the inches are divided differently. That is on a scale of 1-1/2" equal to one foot, the inches are divided into 4 parts or 1/4 inch divisions; whereas the scale of 3/8" equals one foot, the smallest inch division is one inch.	
5. To make double size measurements, use the full scale and multiply each dimension by two.	

METHOD OF EVALUATION:

1. Use of correct scale.
2. Accuracy.

OPERATION SHEET
SC-2-8

COMPETENCY: Use the Engineer's Scale

COURSE: Mechanical Drafting UNIT II: Use and Care of Instruments

OBJECTIVE: To use the engineer's scale in laying out various dimensions.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. For full-size dimensions, use the scale of 10 (1 inch divided into 10 parts). For example, to set off 1.650" full size, read six and one half spaces beyond the one inch mark.	. IL-2-14 . Figure 2-37(a)
2. To set off the same dimension half size, use the 20 scale, since it is half the size of the 10 scale.	. Figure 2-37(b)
3. To set off a dimension quarter size, use the 40 scale.	
4. Another scale has been developed specifically for laying off decimal dimensions. One inch is divided into 50 divisions or .020 for each division. Each fifth division is indicated to help read the scale. For example, 5 times .020 is equal to .100 inches. To read 1640, one has only to set off 6 of the indicated larger spaces to get .600, and then add two of the small divisions to obtain the reading of .640.	. Figure 2-37(c)

METHOD OF EVALUATION:

1. Use of proper scale.
2. Accuracy.

OPERATION SHEET
SC-2-9

COMPETENCY: Use the 30°-60° and 45° Triangles in Combination

COURSE: Mechanical Drafting UNIT II: Use and Care of Instruments

OBJECTIVE: To select the correct 30°-60° and 45° triangles for drawing inclined lines at 15° increments.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout the angles as indicated on the reference figure.	. Figure 2-25 . IL-2-16
2. Start at point "A" and reproduce the triangle wheel using your 30°-60° and 45° triangles as shown.	NOTE: One of the triangles must be resting on the parallel bar when the lines are drawn.

METHOD OF EVALUATION:

1. Correct triangle combination.
2. Accuracy.

OPERATION SHEET
SC-2-10

COMPETENCY: Use the Adjustable Triangle

COURSE: Mechanical Drafting UNIT II: Use and Care of Instruments

OBJECTIVE: To draw inclined lines or measure angles of any degree using an adjustable triangle.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Layout the angles as indicated on the reference figure.	. Figure 2-25
2. Start at point "A" and reproduce the triangle at 15° intervals as shown.	. IL-2-16 . NOTE: One side of the triangle must be in contact with the parallel bar while drawing a line.
3. Add lines to the triangle wheel at every 5° increment.	
4. Add lines to the triangle wheel at the following degrees: 33°, 42°, 72° 89°, 97°, 108°, and 153°.	

METHOD OF EVALUATION:

1. Accuracy of triangle setting.
2. Accuracy of drawing.

OPERATION SHEET
SC-2-11

COMPETENCY: Use the Compass

COURSE: Mechanical Drafting UNIT II: Use and Care of Instruments

OBJECTIVE: To learn to manipulate a compass to draw circles of 1/2" diameter or larger.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Install a piece of 2H lead approximately 1-1/2" long in the compass and sharpen it.	. Figure 2-44
2. Adjust the needle point with the shoulder end out, and so that the point extends slightly past the end of the lead.	
3. Adjust the compass to a radius of 1".	
4. Hold the compass.	. Figure 2-42
5. Lean the compass in the clockwise direction and start the lead moving in a clockwise movement.	NOTE: It takes a lot of practice to master using the compass so be patient and keep trying.

METHOD OF EVALUATION:

1. Manipulation.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-2-12

COMPETENCY: Use the Dividers

COURSE: Mechanical Drafting UNIT II: Use and Care of Instruments

OBJECTIVE: To use dividers to divide measurements into equal parts, transfer measurements, and for setting-off a series of equal distances. The small bow dividers are most useful for small distances; less than one inch.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Check the points to see if they are both the same length.	
2. The tension on the large dividers should be such that you can change the setting with one hand.	
3. Draw a line 4" long and divide it into 7 equal spaces.	. Figure 2-48
4. Draw a line 3" long and divide it into 7 equal spaces with the small dividers.	

METHOD OF EVALUATION:

1. Setting accuracy.
2. Manipulation.
3. Line quality.

COMPETENCY: Use Various Templates

COURSE: Mechanical Drafting UNIT II: Use and Care of Instruments

OBJECTIVE: To select the correct template and position for the best layout and drawing.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. To use the ellipse template, block in the major and minor axis with construction lines that form a rectangle and then select the ellipse that best fits the desired size.	. IL-2-18
2. The circle template is marked to give you the desired circle diameter. This template is placed in position by lining up the center line marks of the template over the center lines on the drawing.	
3. The hexagon template is mostly used for drawing bolt heads and nuts. Center the hexagon over the centerlines on the drawing and draw the hexagon. If your template has no center line marks, draw a light circle whose diameter is equal to the distance across the flats of the hexagon. The hexagon template can then be aligned with the circle.	
4. Some hexagon templates are provided with the shape of the bolt heads as seen from the side view. To draw the side view, project the top and bottom from the hex to the side view and use these projection lines to line up the template.	NOTE: Some templates are marked for the thickness of standard bolt heads. If it is not marked, you will have to check the tables to obtain the thickness.

METHOD OF EVALUATION:

1. Template selection.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-2-14

COMPETENCY: Use Various Irregular Curves

COURSE: Mechanical Drafting UNIT II: Use and Care of Instruments

OBJECTIVE: To select and adjust irregular or French curves and adjustable curves when drawing curves other than circles or arcs.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Whenever an irregular curve is to be used, it is necessary to plot a series of points through which the curve must pass. This is accomplished by projection and transfer of distances. The type of construction will depend on the geometry of the object.	. IL-2-17
2. After the construction points are determined, place the curve over the points in such a way as to line up with as many points as possible.	
3. Draw the control portion of the curve that lines up with the points. CAUTION: If all of the points were connected, you would have difficulty finding a portion of the curve to connect to the adjacent points and have the curve portions appear tangent.	. Figure 2-78
4. To draw the adjacent portion of the curve, the irregular curve must fit a small portion of the previously drawn curve as well as the construction points. REMEMBER: You never draw the curve to the "last" point unless it is the last portion of the curve to be drawn.	

METHOD OF EVALUATION:

1. Template selection.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-3-1

COMPETENCY: Use the Lettering Guide

COURSE: Mechanical Drafting UNIT III: Lettering

OBJECTIVE: To draw letters of various heights using a lettering guide.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Adjust the Ames Lettering guide to obtain a vertical height of 1/8 inch. That is, a setting of "4" or 4/32.	. Figure 3-18 . IL-2-18
2. Use a hard pencil, place the point through the appropriate hole, and move the guide by applying side pressure to the direction you want to move.	. IL-3-1
3. When the first line is completed, place the pencil in the adjacent hole and return the guide by moving in the return direction.	
4. Varying heights of guide lines may be obtained for fractions without changing the setting.	. Figure 3-18

METHOD OF EVALUATION:

1. Guide selection.
2. Spacing.
3. Line quality.

OPERATION SHEET
SC-3-2

COMPETENCY: Letter Vertical Caps and Numbers

COURSE: Mechanical Drafting UNIT III: Lettering

OBJECTIVE: To letter engineering data using vertical capitol letters and numbers.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. On a sheet of 1/8-grid graph paper, letter each of the straight-line letters in a 6-unit square.	. IL-3-1 . Figure 3-19 NOTE: Pay particular attention to the order of the strokes and the width of the letters.
2. Go through the same procedure for the bottom three rows.	
3. Repeat all the letters and numerals except use a 4-unit square.	
4. Repeat all the letters and numerals except use a 2-unit square.	
5. Repeat all the letters and numerals except use a 1-unit square.	NOTE: This will be the size of the lettering used on most drawings.

METHOD OF EVALUATION:

1. Spacing.
2. Line quality.

OPERATION SHEET
SC-4-1

COMPETENCY: Darken Lines

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To learn correct procedure to darken a line as well as the technique of line darkening.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Sharpen a 2H pencil and dress the point until it will produce a good object line (.020").	. IL-2-13
2. Start at the top of the sheet and darken all the horizontal object lines.	
3. Start on the left of the sheet and darken all the vertical object lines.	
4. Sharpen a 3H pencil and dress the point until it will produce a good hidden line (.015").	
5. Start at the top of the sheet and darken all the horizontal hidden lines.	
6. Start at the left of the sheet and darken all the vertical hidden lines.	NOTE: This is some disagreement among authors and teachers regarding this subject. Some say to darken those lines which you are sure of as you proceed.

METHOD OF EVALUATION:

1. Accuracy.
2. Shading quality.

OPERATION SHEET
SC-4-2

COMPETENCY: Keep the Drawing Clean

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To develop cleanliness practices when preparing drawings.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Always draw the object with light construction lines and make sure it is correct before you darken any of the lines.	. IL-2-11
2. Do not slide the bar and triangles over dark lines. Lift the bar or triangles when moving them. A certain amount of sliding may be necessary for the final movement of the bar and triangles, but do it with very little pressure.	
3. Always use a brush to remove eraser dust--never rub the drawing with your hand.	
4. The parallel bar and triangles should be cleaned with a damp cloth or paper towel each day.	
5. Make sure your hands are clean and free of oil. Your finger tips are certain to come in contact with the drawing when moving the triangles.	
6. Never sharpen the pencil over the drawing board. Wipe the point with a damp cloth to remove the loose graphite.	
7. Artgum and Skumex may be used as recommended by the text to help keep the drawing clean; but in most cases it is not necessary if all of the above procedures are followed.	
8. Remember! The drawing becomes dirty primarily due to the loose graphite that rubs off of the dark lines.	
9. If the drawing is to be left on the board overnight, it should be covered.	

METHOD OF EVALUATION:

1. Proper use of tools.
2. Cleanliness.

OPERATION SHEET
SC-4-3

COMPETENCY: Bisect a Line

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To bisect a line using geometric principles and procedures.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a line 3-15/16" long on any angle.	
2. Label the ends A & B.	
3. Swing arcs from A & B with radius greater than half the lengths of the line.	
4. Join the intersections of the arcs with a straight line.	. Figure 4-8
5. Label the center point C.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-4

COMPETENCY: Bisect an Angle

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To bisect an angle using geometric procedures.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw an acute angle and label the points A, B and C. 2. Swing any convenient radius (R) and label points E & F. 3. Swing any convenient radius (R) from E and F and label their intersection point D. 4. Draw the bisector line from D to A.	. Figure 4-10

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-5

COMPETENCY: Transfer an Angle

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To transfer an angle or other object from one position to another.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw an acute angle in the approximate position of ABC.	. Figure 4-11
2. Determine the new position of side AB and mark it A'B'.	
3. Use any convenient radius R and swing arcs from points A and A'.	
4. Determine radius r by setting the compass center on B and adjust the compass until the lead touches point C.	
5. Swing radius r from B' until it intersects radius R and label the intersection C'.	
6. Draw the side of the angle A'C'.	
7. Check both angles with your adjustment triangle--both angles should be the same degree.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-6

COMPETENCY: Draw Parallel Lines

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To develop skill in drawing parallel lines.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a line on any angle and draw a line parallel to it with the aid of the 30 x 60 and 45 triangles.	. Figure 4-12b NOTE: Do not draw the first line on 30, 45 or 60.
2. Using the adjustable triangle, draw a line sloping to the left at an angle of 23° to the horizontal.	
3. With the adjustable triangle draw a line 2" away and parallel to the first line.	NOTE: Make certain that the triangle is in contact with the parallel bar when making both lines.
4. Draw a line 2-1/2" away from the second line without the use of the adjustable triangle--use only a compass and a straight edge.	. Figure 4-13a
5. Draw an irregular curve at least 3" long and draw a curve parallel and 2" away.	. Figure 4-13c

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-7

COMPETENCY: Divide Lines into Equal and Proportional Parts

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To use dividers to proportion distances and transfer measurements.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Hold and manipulate dividers using correct procedures.	. Figures 2-47, 2-48, 2-52
2. Draw a line 4-1/2" long and divide it into seven equal spaces using the small bow dividers. CAUTION: This is accomplished by trial and error.	
3. Divide the same line into three equal spaces using the large dividers.	
4. Draw a line 3" long and divide it into two spaces having the ratio of 1-1/2 to 1. CAUTION: The trick in doing this is to get the pivot point of the proportional dividers in the correct place. The pivot point is on a calibrated slide which must be adjusted until the correct setting is obtained.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-8

COMPETENCY: Divide Lines Using the Parallel Line Method

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To use the parallel line method to divide lines.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a horizontal line 4" long and divide it into seven equal parts.	. Figure 4-14 . IL-4-3
2. Divide a 4" line into three proportional parts of 2, 3 and 4.	. Figure 4-17a
3. Divide a 4-1/2" line into the same parts.	. Figure 4-17b NOTE: Any one unit of the scale may be used, but always use the same unit for all divisions.

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-9

COMPETENCY: Construct Triangles When Sides Are Given

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To construct triangles when side measurements are given.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw horizontal line 5" long near the center of the space.	
2. From the left end of the line, swing a 3" radius.	
3. From the right end of the line, swing a 4" radius until it intersects the 3" radius.	
4. From the intersection of the arcs, connect lines to both ends of the horizontal line.	
5. Check the triangle with your scale to see if the sides measure 3", 4" and 5".	
6. Construct the same triangle with the 3" side in the horizontal position.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-10

COMPETENCY: Construct Right Triangles With Two Sides Given

COURSE: Mechanical Drafting **UNIT IV:** Geometric Construction

OBJECTIVE: To construct a right triangle when side measurements are known.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a horizontal line 6" long near the center of the space.	
2. Bisect this line.	
3. Swing a semicircle with its center on the bisector point and having a radius of 3".	. Figure 4-20
4. Swing a radius of 2" from the left end until it intersects the semicircle.	
5. From this intersection draw lines to each end of the horizontal line.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-11

COMPETENCY: Construct Perpendicular Lines

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To construct parallel lines.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a straight line near the center of the sheet.	NOTE: Do not tape the drawing sheet to the board.
2. Establish a point P approximately 2" away from the line.	
3. Swing a radius from P large enough to cross the line in 2 places C & D.	. Figure 4-18b
4. Bisect the distance CD.	
5. Draw the perpendicular line from P to the intersection of the bisector arcs.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-12

COMPETENCY: Construct Squares

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To draw squares used in basic forms such as bolts, nuts and set screws.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Use the compass and layout the corners of a 2" square.	. Figure 4-23a
2. Use the scale to measure the one side and the 45° triangle to construct a 2-1/2" square.	. Figure 4-23b
3. Draw a square on the inside of a 3" diameter circle.	. Figure 4-23c
4. Draw a 2-3/4" square on the outside of a circle.	. Figure 4-23d

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-13

COMPETENCY: Construct a Pentagon

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To draw a pentagon using two basic techniques.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a 3" diameter circle.	
2. Divide the circumference into five equal spaces.	. Figure 4-24a
3. Connect these points to form the pentagon.	
4. Draw another 3" diameter circle.	NOTE: Follow carefully the lettering and construction procedure of Figure 4-24b.
5. Bisect the distance O D.	
6. Swing R by setting the compass center at C and adjusting the radius to correspond to A.	
7. With the compass center at A, swing R to locate B.	
8. The distance AB will be the length of one side.	
9. Complete the pentagon as before.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-14

COMPETENCY: Construct Hexagons

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To develop skill in constructing a hexagon without use of a template.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a 3" diameter circle and construct a hexagon inside.	. Figure 4-26 a & b
2. Draw a 2" diameter circle and construct a hexagon outside.	. Figure 4-26 c & d
3. Draw a hexagon having sides one inch long.	. Figure 4-27

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-15

COMPETENCY: Construct Octagons

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To develop skill in constructing an octagon without use of a template.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a 3" diameter circle.	
2. Construct an octagon on the outside of the circle.	. Figure 4-28a
3. Draw a 3" square.	
4. Swing arcs from each corner.	. Figure 4-28b
5. Construct the octagon inside of the square.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-16

COMPETENCY: Use the Prick-Point Method of Checking

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To use the prick-point method to transfer views or parts of views from one position to another or from one sheet to another.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a circle 3" in diameter.	
2. Draw vertical and horizontal centerlines.	
3. Construct a pentagon inside the circle.	
4. Lay a piece of tracing paper over the pentagon.	
5. Mark the corners and centerlines with the points of the dividers.	
6. Transfer the pentagon to a new position on the paper and rotate it 15° clockwise.	
7. Mark the corners and centerlines and connect the corners to form the pentagon.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-17

COMPETENCY: Determine Tangent Points

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To use tangent points for a smooth transition to straight lines.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw a 1" diameter circle and construct a tangent line at 45^0.	. Figure 4-34a
2. Draw a 1" circle and a 2" circle whose center distance is 3".	
3. Construct tangents on top and bottom.	. Figure 4-35a
4. Construct cross-tangents on the same circles.	. Figure 4-35b
5. Draw two lines forming a 60^0 angle.	
6. Draw a 1" radius tangent to these lines.	. Figure 4-38a
7. Draw two lines forming a 120^0 angle.	. Figure 4-38b
8. Draw a 2" radius tangent to these lines.	. Figure 4-38b
9. Construct an arc tangent to another arc and a straight line. Let G equal 1", R equal 1/2", and the vertical distance from O to the horizontal line is 1-1/4".	. Figure 4-39a
10. Construct an arc tangent to another arc and a straight line. Let G equal 1-1/2". R equal 3/4", and the vertical distance from O to the horizontal line be 1/4".	. Figure 4-39b
11. Draw a 1" circle and a 1-1/2" circle with their centers 2" apart.	
12. Draw a 2" arc tangent to these circles.	. Figure 4-40a

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-18

COMPETENCY: Draw an Ogee Curve

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To connect two parallel lines or two non-parallel lines using Ogee curves, or "reverse curves" as they are sometimes called.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw two horizontal lines 2" apart.	. Figure 4-43
2. Label A and B using a distance of 2-3/4" (AB = 2-3/4").	
3. Draw a line connecting A & B.	
4. Determine a point (T) 1/3 the distance from A towards B.	
5. Draw vertical lines from A & B.	
6. Draw perpendicular bisectors AT and BT.	
7. The intersection of the bisectors and the vertical lines form the center points F & C.	
8. Complete the ogee curve by drawing an arc from A to T and an arc from T to B.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-19

COMPETENCY: Use the Foci Method of Drawing an Ellipse

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To draw an ellipse using the foci method. Every time a circle is viewed from a non-perpendicular position, it appears as an ellipse.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw horizontal and vertical center lines.	. Figure 4-48
2. Layout A & B 3" apart on the horizontal center line.	
3. Layout C & D 2" apart on the vertical center line.	
4. Swing arc R from C & D as shown to establish E & F. (R = 1/2 of AB)	
5. Mark off 6 points at random on the horizontal center line from the center toward E. Number these points 1 through 6.	
6. Adjust the compass to the distance from A to point 1.	
7. Swing this arc from E.	
8. Adjust the compass to the distance from B to point 1.	
9. Swing this arc from F.	NOTE: All radii are either centered at E or at F. The distance from the numbers (1 through 6) are used to establish the radius.
10. Adjust the compass to the distance from A to point 2.	
11. Swing this arc from E.	
12. Adjust the compass to the distance from B to point 2.	
13. Swing this arc from F.	

COMPETENCE - PROCEDURES/STEPS	TEACHING/LEARNING ACTIVITIES
14. Repeat the previous four steps for each point.	
15. Connect the intersections of the arcs with the French curve to form the ellipse.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-20

COMPETENCY: Use the Concentric-Circle Method of Drawing Ellipses

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To use an irregular curve with the concentric-circle method to draw an ellipse.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw center lines.	
2. Draw a 3" circle and a 2" circle on these center lines.	
3. Draw radial lines every 15°.	. Figure 4-50
4. Consider the first 15° line.	
5. Drop the vertical line from the intersection of the radial line and the 3" circle.	
6. Draw a horizontal line from the intersection of the radial line and the 2" circle.	
7. Mark the intersection of the vertical and horizontal line as a point on the ellipse.	
8. Repeat the previous three steps for the 30° line.	
9. Repeat steps 5, 6 and 7 for the remaining radial lines.	
10. Connect the points with an irregular curve to complete the ellipse.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-21

COMPETENCY: Use the Parallelogram Method of Drawing an Ellipse

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To construct a parabola from a right circular curve. This curve is sometimes used in designing light reflectors and architectural arches.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw vertical and horizontal center lines.	
2. About this center, construct a rectangle 2" high and 3" long.	
3. Label the corners of the rectangle.	. Figure 4-52a
4. Divide AO and AJ into 8 equal parts and number each point starting at A.	
5. Draw lines from D through the points on AO.	
6. Draw lines from C through the points on AJ.	
7. The intersections of these lines should be marked with a point to indicate that they are to form the curve of the ellipse.	
8. Repeat the process for the other three quadrants.	
9. Connect the points with an irregular curve.	
10. Repeat the entire process using a vertical center line sloping 15° to the right.	. Figure 4-52b NOTE: The sides of the parallelogram must remain parallel to the center lines.

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-22

COMPETENCY: Construct a Parabola

COURSE: Mechanical Drafting **UNIT IV:** Geometric Construction

OBJECTIVE: To draw a parabola using a right circular cone cut by a plane.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Identify points on referenced figure.	. Figure 4-57c
2. Identify the rise.	Note that the "rise" is the horizontal distance of the parabola when it is in the position shown.
3. Identify the span.	Note that the "span" is the vertical distance of the parabola when it is in that position.
4. Locate distance AO.	Note that the distance AO is divided into 4 equal spaces.
5. Locate distance AD.	Notice that the distance AD is divided into 16 (4 squared) equal spaces.
6. Draw a rectangle ABCD which has a rise of 2-1/2" and a span of 4".	
7. Divide the distance QA into five equal spaces and number the points.	
8. Divide the distance AD into 25 (5 squared) equal spaces and mark the points that are perfect squares: 1, 4, 9, 16, and 25.	
9. Draw a horizontal line through point 1 between A and O.	
10. Draw a vertical line from point 1 between A and D.	
11. Mark the intersection of these two lines as a point on the parabola.	

COMPETENCE - PROCEDURES/STEPS	TEACHING/LEARNING ACTIVITIES
12. Draw a horizontal line through point 2 between A and O.	
13. Draw a vertical line from point 4 (2 squared) between A and D.	
14. Mark the intersection of these two lines as a point on the parabola.	
15. Repeat the previous three steps for each of the points from O to A.	
16. Transfer the points to the bottom half by extending the vertical lines below the center and by using the dividers to transfer the point on these lines.	
17. Draw the parabola with an irregular curve.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-23

COMPETENCY: Construct a Hyperbola

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To form a hyperbola by using a right circular cone cut by a plane.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Locate the "foci" of the hyperbola.	. Figure 4-60b NOTE: Points F and F' are known as the "foci" of the hyperbola.
2. Locate the transverse axis.	NOTE: The distance AB is the transverse axis.
3. Draw vertical and horizontal center lines and label the center C.	
4. Draw the transverse axis 1" long and label it AB.	
5. Locate F and F' 3/4" on each side of the center line.	
6. Select any point X on the horizontal axis as shown.	
7. With centers at F and F', and BX as a radius, strike the arcs DE.	
8. With the same centers (F and F') as a radius, strike arcs QR to intersect the first arcs.	
9. Mark these points as being on the hyperbola.	
10. Select another X point 1/4" away from the first X and repeat steps 8, 9 and 10.	
11. Repeat step 11 for three more X points.	
12. Draw the hyperbola with the irregular curve.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-24

COMPETENCY: Construct Archimede's Spiral

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: This curve may be used in various machine designs where a radius is required to constantly change.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw vertical and horizontal center lines.	
2. Draw a circle 4" in diameter.	
3. Divide this circle every 15°.	. Figure 4-62
4. Divide the radius of the circle into the same number of 15° divisions.	
5. With the compass, rotate the first division on the radius to the 15° line.	
6. Rotate the second division on the radius to the 30° line.	
7. Rotate the third division on the radius to the 45° line.	
8. Continue until all the points are rotated.	
9. Connect the points with the irregular curve.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-25

COMPETENCY: Construct a Helix

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To draw a helix as the path of a point moving around and along the surface of a cylinder cone. An inclined plane can be wrapped around a cylinder to form a helix. This principle can be used in screw-thread, cam and spring design.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Identify the "lead" on the referenced figure.	. Figure 4-63b NOTE: The "lead" is the distance a point would travel parallel to the axis during one complete revolution.
2. Draw a 3" circle to represent the front view of a cylinder.	
3. Block in the top view by using a lead of 2".	
4. Divide the circle every 15°.	
5. Divide the lead into the same number of spaces as the circle.	
6. Project the divisions from the circle to the top view.	
7. Draw horizontal lines through the marks on the lead to form intersections with the lines of step #6.	
8. Connect the points of intersection with the irregular curve to form the helix.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-4-26

COMPETENCY: Construct an Involute

COURSE: Mechanical Drafting UNIT IV: Geometric Construction

OBJECTIVE: To construct an involute curve around a closed geometric figure such as a square, rectangle, hexagon or a circle used in designing involute gear teeth.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw an equilateral triangle having 1" sides and label the corners ABC.	. Figure 4-64b
2. Swing a radius AC from C until it intersects a line extending through AB. Label this point D.	
3. Swing a radius BD from B until it in intersects a line extending through AB. Label this point E.	
4. Swing a radius AE from A until it intersects a line extending through AC. Label this point F. This completes the involute for one revolution of the triangle.	
5. Draw the involute for one revolution of a 1" square.	. Figure 4-64c
6. Draw an arc having a radius of 2".	
7. Using 1/2" spaces on the arc, set off 5 spaces.	. Figure 4-64c
8. Draw radial lines from these points to the center of the arc.	
9. Draw tangent lines for each point.	NOTE: A tangent line will be at right angles to the radial lines.
10. Using the dividers, mark off the first 1/2" space on the tangent line from point 1.	
11. Mark off two 1/2" spaces on the tangent line from point 2.	

COMPETENCE - PROCEDURES/STEPS	TEACHING/LEARNING ACTIVITIES
12. Mark off three 1/2" spaces on the next tangent line and continue in this manner with all the tangent lines.	
13. Connect the end points on the tangent lines with the irregular curve to complete the involute.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-5-1

COMPETENCY: Determine the Necessary Views

COURSE: Mechanical Drafting UNIT V: Multiview Projection

OBJECTIVE: To determine views necessary for a multiview projection to reduce time involved and to keep drawings as simple as possible.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Identify the complete set of views on the referenced figure.	. Figure 5-26a, 5-26b NOTE: The complete set of views is shown. The front view and rear view show the true shape of the hole and rounded top.
2. Eliminate the rear view because the front view has no hidden lines.	NOTE: The top and bottom views show the rectangular notch and rounded corners.
3. Eliminate the bottom view because the top view has fewer hidden lines.	NOTE: Both the right side and and left side views are identical.
4. Eliminate the left side view because it is customary to show the right side view if the two views are the same.	

METHOD OF EVALUATION:

1. Selection of proper view.

OPERATION SHEET
SC-5-2

COMPETENCY: Estimate the Spacing of Orthographic Views

COURSE: Mechanical Drafting UNIT V: Multiview Projection

OBJECTIVE: To develop spacing techniques that will provide effective use of the drawing area for views, notes, engineering data and dimensions.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Identify sizes; ie, the width of the front view is 4-1/4", and the depth of the side view is 2-1/4" while the working space is 10-1/2" long.	. Figure 6-9
2. Assume a space C between the views of 1-1/4". This will look good and provide enough space for dimensions.	
3. Determine at A by adding 4-1/4", 2-1/4", and 1-1/4".	
4. Subtract the sum of step 3 from 10-1/2".	
5. Divide by 2 to get the spacing at each end.	NOTE: The depth of the top view is 2-1/4" and the height of the front view is 1-3/4", while the height of the working space is 7-5/8".
6. Assume a space D between the views of 1". Remember we are only "estimating" the spacing.	
7. Determine space B by adding 2-1/4", 1-3/4", and 1".	
8. Subtract the sum of step 7 from 7-5/8".	
9. Divide the result by 2 to get the spacing at the top and bottom.	
10. Very lightly, block in the views.	
11. Review spacing and make necessary adjustments.	
12. Darken lines.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

COMPETENCY: Use the Numbering System in Multiview Projection

COURSE: Mechanical Drafting — UNIT V: Multiview Projection

OBJECTIVE: To visualize what a certain view may look like if two views are presented and to show how other views can be completed by using the numbering system. This method is specifically useful when an object is not drawn in a natural position--such as a block that is tipped up or tilted backwards.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Locate the points in the front and top view.	. Figure 6-8 NOTE: For every point numbered in the front view, the same numbers and points occur in the top view. (Figure 6-8I)
2. Recognize that when a number is to the outside of the view, that number represents the corner nearest the observer. That is, point 1 is on the front edge of the front view, and point 2 is on the back edge of the front view.	
3. Locate point 8 and 10 of the top view. Point 8 is on the inside of the view--so it represents the top corner. Point 10 is on the outside--so it represents the bottom corner.	
4. Project front view points to the right-side view. Points in the front view determine their vertical position in the right-side view when they are projected.	
5. Project top view points to the right-side view. Points in the top view determine their horizontal position in the right side view when they are projected.	
6. Plot intersections. The intersection of the projection lines for each point will determine its position in the right-side view.	
7. Follow the projection line from point 1 in the front view to the right-side view, and notice where it intersects the projection line coming from point 1 in the top view. This intersection will be point 1 in the right-side view.	

COMPETENCE- PROCEDURES/STEPS	TEACHING/LEARNING ACTIVITIES
8. Plot the remaining points by the same procedure.	
9. Draw the completed view.	NOTE: When all the points are plotted, the view can be completed.

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-5-4

COMPETENCY: Layout the Orthographic Views

COURSE: Mechanical Drafting UNIT V: Multiview Projection

OBJECTIVE: To develop a correct procedure to layout views and reduce time required for adjustments.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Compute spacing, block the views and draw a rectangle that will contain each view.	NOTE: Use a hard pencil and make sharp, fine lines.
2. Layout spacing, dimensioning and appearance.	NOTE: Do you have room to add dimensions where you want? Do the views adequately use the drawing space? Are you allowing room for notes, title block, revisions, and bill-of materials?
3. Draw the circles and arcs and mark any tangent point with a dot.	
4. Project the circles and arcs to the other views.	
5. Complete the construction of the views by developing them together.	NOTE: Do not complete one view at a time. When a specific detail is completed in one view, project it to the other views.
6. When all the views are complete, erase any unnecessary construction such as arcs drawn beyond the tangent points and over-run corners.	
7. Review work in preparation for final step.	NOTE: This is the critical time for checking. If anything is wrong, it can be changed easier now than it can after the lines are darkened.
8. Darken the lines on the drawing.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-5-5

COMPETENCY: Check Views for Completeness

COURSE: Mechanical Drafting UNIT V: Multiview Projection

OBJECTIVE: To develop a method of checking drawings. The fastest and most accurate method of making a drawing is to take your time and check it carefully.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Check views for completeness. This should be done when the views are completely layed out and before any lines are darkened.	
2. Check to see if all edges are in projection by moving the parallel bar to each corner or edge. Notice that the lines in each view are in line.	
3. Check the vertical projections by using the triangle on the parallel bar.	
4. Consider all edges that may produce hidden lines.	
5. Determine that all center lines are correct in each view.	
6. Determine that every corner or edge produces a corresponding line in the other views.	
7. Determine that arcs and circles stop or start at the tangent points, whichever may be the case.	
8. Darken the views after you are satisfied that the views are complete.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-6-1

COMPETENCY: Make Freehand Sketches

COURSE: Mechanical Drafting UNIT VI: Freehand Sketching

OBJECTIVE: Most original mechanical ideas are expressed by freehand sketches. Engineers express ideas in the form of sketches for the draftsman to interpret. Sketches are necessary to plan changes in existing equipment.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Prepare pencil for sketching.	. Figure 5-6, IL-6-1
2. Practice sketching horizontal lines.	. Figure 5-7
3. Practice sketching vertical lines.	. Figure 5-8
4. Practice sketching circles.	. Figures 5-11 and 5-12
5. Practice sketching arcs.	. Figure 5-14
6. Practice sketching ellipses.	. Figure 5-15
7. Notice how irregular shapes are blocked-in.	. Figure 5-20
8. Consider the design sketch of referenced figure. Would you be able to make a drawing from this sketch?	. Figure 5-1

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-8-1

COMPETENCY: Draw Sectional Views

COURSE: Mechanical Drafting UNIT VIII: Sectional Views

OBJECTIVE: To understand and draw sectional views to show complicated interiors. We frequently have parts with complicated interiors that cannot be shown clearly by hidden lines. A cutaway view is then drawn so as to show the interior as solid lines. If the object is cut fully through, it is called a "full section." If it is cut halfway through, it is called a "half section."

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Locate the cutting plane which is passed fully through the front view, indicating a full section.	. IL-8-2 . Figure 7-2
2. Layout the section view. The section view is drawn as if half of the object is removed and you are looking at the other half.	NOTE: Which view is easiest to read, the left-side section view or the right-side view?
3. Locate arrows on the cutting plane which indicate the direction you are looking at for the remaining half.	NOTE: The hidden lines are omitted in the section view.
4. Locate cutting for plane and section lines. Whenever the cutting plane passes through solid material, section lines are drawn as shown in the sectional view.	Figure 7-10
5. Locate the cutting plane. Notice that the cutting plane extends only halfway through the object--so it is called a half-section.	
6. Locate drawing details. The half-section has the advantage of showing the inside detail, as well as the outside detail.	NOTE: This type of section is restricted to symmetrical objects; that is, objects that both halves are identical.

METHOD OF EVALUATION:

1. Selection of full section.
2. Selection of half section.

OPERATION SHEET
SC-8-2

COMPETENCY: Revolve Holes and Ribs in Section

COURSE: Mechanical Drafting UNIT VIII: Sectional Views

OBJECTIVE: To draw sectional views with ribs and holes correctly displayed. Sometimes when we draw sectional views, the true projection of ribs and holes may be misleading. When this happens, we revolve the ribs and holes for the purpose of clarity.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Observe how the cutting plane passes through the front view.	. Figure 7-27 . IL-8-1
2. Draw the arm. A true projection from the cutting plane would not show the true length of the arm in the right-side view--so the arm is rotated to the vertical center line before projecting to the right-side view.	
3. Draw the drill and counterbore. Observe the same practice of rotating the cutting plane to show the drill and counterbore.	. Figure 7-28 NOTE: The same procedure is used in Figure 7-29
4. Project the rib to the side view. The referenced drawing shows the cutting plane passing through a rib that is not on the vertical center line. The rib is rotated to the vertical center line before it is projected to the side view.	. Figure 7-30a
5. Compare the side views to determine the view that is easier to draw and "read."	. Figure 7-31

METHOD OF EVALUATION:

1. Correct layout of ribs and holes.

OPERATION SHEET
SC-9-1

COMPETENCY: Estimating Spacing for Auxiliary Views

COURSE: Mechanical Drafting UNIT IX: Auxiliary Views

OBJECTIVE: The spacing of auxiliary views are not as easy to do as regular orthographic views because the auxiliary views can be drawn or projected on any angle.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. The first step in estimating the spacing of views is to determine the number of views required.	. Figure 8-6
2. Block in those views in the approximate location that seems reasonable. CAUTION: Always block-in the views very lightly so they can easily be erased if necessary.	. Figure 8-61v
3. Relocate any views that seem crowded.	
4. Consider the six views of referenced figure.	. Figure 8-7b
5. If you were to figure spacing for these views, you would want to center the front view and estimate the spacing of the remaining views.	
6. When the views are blocked-in, a visual inspection will easily reveal where the spacing can be improved.	

METHOD OF EVALUATION:

1. Layout.
2. View selection.
3. Spacing.

OPERATION SHEET
SC-9-2

COMPETENCY: Transfer Measurements and Project Auxiliary Views

COURSE: Mechanical Drafting UNIT IX: Auxiliary Views

OBJECTIVE: Many objects have features that do not show their true shape in any of the orthographic views. When this happens, we have to use auxiliary views to show these shapes.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Identify surface "P".	. Figure 8-2 NOTE: Surface P does not show true size in either the front or top view.
2. Project an auxiliary view where surface "P" shows as a line-an edge view.	
3. Draw perpendicular projection lines.	. Figure 8-2c
4. Transfer depth measurement from the top view to the auxiliary view.	. Figure 8-2c
5. Complete the auxiliary view.	NOTE: The length of the auxiliary view is controlled by the projected lines, and that the depth is controlled by transferring the depth from the top view.

METHOD OF EVALUATION:

1. Correct projection.
2. Accuracy.

OPERATION SHEET
SC-9-3

COMPETENCY: Use the Folding Line Method of Projecting Auxiliary Views

COURSE: Mechanical Drafting **UNIT IX.** Auxiliary Views

OBJECTIVE: To develop skill in using the folding line method of projecting auxiliary views. The folding line method tries to clarify the positioning of the auxiliary view. The horizontal plane (top view), and the auxiliary plane (auxiliary view), are unfolded to line in the plane of the front view.

COMPETENCE · PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Locate the folding line. This is the hinge line joining the planes.	. Figure 8-2
2. Notice that the folding line is the same distance X from the top view as it is from the auxiliary view.	
3. Use the folding line as a reference line. The projection is the same as discussed previously but in this method, it is possible to take measurements from a reference line--the folding line.	. SC-9-2
4. Use folding lines with successive auxiliary views. This method will be of more significance when you get into successive auxiliary views such as shown in the reference.	. Figure 8-21
5. Take measurements from the folding line. The folding line will always provide a line to take measurements from and to indicate where to place them.	. Figure 8-21

METHOD OF EVALUATION:

1. Layout.
2. Accuracy.
3. Neatness.

OPERATION SHEET
SC-9-4

COMPETENCY: Use the Reference Plane Method of Projecting Auxiliary Views

COURSE: Mechanical Drafting UNIT IX: Auxiliary Views

OBJECTIVE: To assume a reference plane, or datum plane for transferring distances and drawing the auxiliary view.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Locate the reference plane RP in the top and auxiliary views.	. Figure 8-5a
2. Draw the reference plane. The reference plane can be located at any convenient place.	. Figure 8-5a and b
3. Obtain measurements which can be taken from the reference plane and layed out from the reference plane of the auxiliary view.	
4. Use this method which works well with symmetrical objects such as shown in the reference.	. Figure 8-12a

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-9-5

COMPETENCY: Draw Secondary Auxiliary Views

COURSE: Mechanical Drafting UNIT IX: Auxiliary Views

OBJECTIVE: To draw a secondary auxiliary view or an auxiliary view projected from the first auxiliary view. This is sometimes necessary when a surface does not show as an edge in any of the orthographic views.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Identify the sloping surface which does not show as an edge in either the top or front views.	. Figure 8-22I
2. Draw the first auxiliary view. The first auxiliary view must be drawn in such a way so the sloping surface shows as an edge.	
3. Project the second auxiliary view perpendicular from the edge of step 2 above (first auxiliary view).	. Figure 8-22II.
4. Locate the distance for the secondary auxiliary view which is transferred from the front view.	. Figure 8-22III CAUTION: Be careful that your reference line or folding line always remains perpendicular to the projection line.

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-10-1

COMPETENCY: Revolve a Prism

COURSE: Mechanical Drafting UNIT X: Revolutions

OBJECTIVE: To develop skill in revolving a prism in an orthographic projection. Revolving a prism is no different than drawing the regular orthographic views except that the object seems to be in an unnatural position. Once you are capable of revolving a prism, you can feel confident that you can handle any orthographic projection.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Identify differences in referenced figures. Notice that the figure is revolved 30° in Figure 9-5 II.	. IL-10-1 . Figure 9-5 I
2. Locate the axis in referenced figures. Figure 9-5 II shows an axis placed in each of the views. This axis should be placed to show as a point in the first view to be rotated.	. Figure 9-5 II RULE: The view with the axis showing as a point does not change except in position.
3. Rotate the top view 30° from the position shown in II.	. Figure 9-5 III
4. Draw the view shown in view III. Place the point-axis in the top view and draw the view rotated 30°.	
5. Complete the remaining views.	
6. Project the height from space II.	
7. Locate the point axis. If we take the right-side view in space III and rotate it 15° as in space IV, we must place the point-axis in that view as shown in space IV.	
8. Insure that the point-axis view is not changed except in position.	
9. Project and complete the remaining views.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-11-1

COMPETENCY: Determine the Axis Position of Isometric Drawings

COURSE: Mechanical Drafting **UNIT XI:** Axonometric and Oblique

OBJECTIVE: To show three planes or surfaces in one view using an isometric drawing. The position of the axis determines which three surfaces of the object are to be shown.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Locate the different positions of the axis and the three sides or surfaces that are related to each axis position.	. Figure 16-9 . IL-11-1
2. Locate the axis which in isometric drawings can be placed on any corner of the object and in any of the four positions shown.	
3. Select an axis position. The axis position that you choose will depend on which three surfaces you want to show--usually the surfaces with the most detail are shown.	
4. Locate the axis position which is chosen so as to show the top, left, and front side because these surfaces reveal the most detail about the object.	. Figure 16-15
5. Locate the long axis which is horizontal because it is convenient to draw a long object horizontal and still be able to show one end.	. Figure 16-11

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-11-2

COMPETENCY: Draw Circles in Isometric Drafting

COURSE: Mechanical Drafting UNIT XI: Axonometric and Oblique

OBJECTIVE: To construct circles in isometric views which appear as ellipses and require a special kind of construction.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Locate the cube which shows the construction of a circle, ellipse in isometric, on each of the three surfaces or planes.	. Figure 16-26
2. Draw a 1" diameter circle on the front plane in which you would construct the front portion of the cube with 1" sides.	
3. Construct a circle on the top plane.	. Figure 16-25
4. Construct isometric circles or ellipses as per reference. Notice the construction is for the top surface.	. Figure 16-24

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-11-3

COMPETENCY: Draw Irregular Curves in Isometric Views

COURSE: Mechanical Drafting UNIT XI: Axonometric and Oblique

OBJECTIVE: To transfer irregular curves in isometric drawings from a grid on the orthographic view to a grid on the isometric view.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Draw the orthographic view showing the irregular curve.	. Figure 16-21a
2. Draw a grid.	. Figure 16-21a
3. Transfer the grid to the isometric view.	. Figure 16-21 III
4. Transfer vertical and horizontal distances from the orthographic grid to the isometric grid.	
5. Connect the points with an irregular curve to complete the isometric curve.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

COMPETENCY: Determine the Axis Position for Oblique Views

COURSE: Mechanical Drafting UNIT XI: Axonometric and Oblique

OBJECTIVE: To construct an oblique drawing. The oblique drawing, like the isometric, makes it possible to show three planes or surfaces on one view. However, the oblique drawing is somewhat easier to draw because circles may be drawn with the compass on the frontal plane.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Locate different positions of the axis. Any number of positions may be used because the receding axis may be drawn at any angle.	. Figure 17-5 NOTE: Two of the axes are always drawn at right angles or perpendicular.
2. Select an axis position. The axis position that you choose will depend on which three surfaces you want to show and the angle of the receding axis.	
3. Locate and notice the effect of the receding axis.	. Figure 17-6
4. Locate the angle of the receding axis which may be affected by the location of detail on the top and side.	. Figure 17-6

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-11-5

COMPETENCY: Draw Circles in Oblique Views

COURSE: Mechanical Drafting UNIT XI: Axonometric and Oblique

OBJECTIVE: To layout circles. Circles in the frontal plane of oblique views can be drawn with the compass, and circles in the other planes must be drawn as shown previously in isometric views. Usually we try to arrange the object so that the circles fall in the frontal plane.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Determine the axis.	. IL-11-3
2. Draw the circles that fall on the frontal plane.	. Figure 17-13 . Figure 17-13 I
3. **Plot** along the receding axis those centers of circles that fall behind the frontal plane.	. Figure 17-13 II
4. Draw remaining circles as shown on the reference.	. Figure 17-13 III
5. Determine all points of tangency.	. Figure 17-13 IV
6. Darken circles.	. Figure 17-13 V
7. Locate circles that fall in the other planes.	. Figure 17-14b

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

OPERATION SHEET
SC-11-6

COMPETENCY: Draw Irregular Curves in Oblique Views

COURSE: Mechanical Drafting UNIT XI: Axonometric and Oblique

OBJECTIVE: To draw irregular curves in oblique views. Irregular curves must first be drawn on the regular orthographic views and then transferred to the oblique view.

COMPETENCE - PROCEDURES/STEPS The student will be able to:	TEACHING/LEARNING ACTIVITIES
1. Locate the circle or curve which is divided and projected to the side view.	. Figure 17-18 . Figure 17-18a
2. Transfer measurements from the side view, which must be transferred parallel to the receding axis of the oblique view.	. Figure 17-18b
3. Connect the points with an irregular curve.	

METHOD OF EVALUATION:

1. Neatness.
2. Accuracy.
3. Line quality.

EXAMPLE

INFORMATION SHEET
IL-2-5

TITLE: Grades of Pencils

COURSE: Mechanical Drafting UNIT II: Use and Care of Instruments

High quality drawing pencils should be used in Technical Drawing, never ordinary writing pencils.

Drawing pencils are made of graphite with kaolin (clay) added in varying amounts to make 18 grades from 9H (the hardest) to 7B (the softest).

Specially formulated plastic base leads are available also in several grades for use on polyester film.

Hard: 9H, 8H, 7H, 6H, 5H, 4H.
The first three in this group are used where extreme accuracy is required, as on graphical computations and charts and diagrams. The other three are used some for line work on engineering drawings. Their use is restricted because the lines are too light.

Medium: 3H, 2H, H, F, HB, B.
This group is for general purpose work in Technical drawings. The H, 2H and 3H are widely used for line work on pencil drawings, or tracings for blueprinting. The F and H are used for arrowheads and lettering. The F, HB and B are used for technical sketching.

Soft: 2B, 3B, 4B, 5B, 6B, 7B.
This group is too soft to be used in mechanical drawing. Their use would result in smudged rough lines which are hard to erase. They are used for art work of various kinds, and for full-size details in architectural drawing.

To select the grade of pencil, first consider the linework required. For light construction lines, guide lines for lettering, and for accurate geometrical constructions or where accuracy is of extreme importance, use a hard pencil such as 4H, 5H or 6H. For mechanical drawings to be reproduced, the lines should be jet-black. The pencil must be soft enough to produce black lines, but hard enough not to smudge or break under normal pressure. The pencil for this purpose would be the H, 2H and 3H.

Another factor to consider in choosing a lead guide is the paper texture. If the paper is hard and has a decided tooth, it will be necessary generally to use harder leads. For smoother surfaces, softer leads can be used.

EXAMPLE

ASSIGNMENT SHEET
AS-5-1
p. 1 of 3 pp.

TITLE: Multiview Projection

COURSE: Mechanical Drafting UNIT V: Multiview Projection

TEXT/REFERENCE: TECHNICAL DRAWING, Giesecke, Mitchell, Spencer, Hill. 5th Edition, pp. 160-193.

ASSIGNMENT: Study carefully the above reference and write the answers to the following questions.

1. A view of an object is known technically as a ____________________.
2. A projections is a view conceived to be drawn or projected onto a plane known as the ____.
3. A view is obtained by drawing perpendiculars, called ______________; from all points on the edges or contours of the object to the plane of projection.
4. The plane of projection upon which the front view is projected is called the ____________________ ____________________.
5. List the three principal dimensions of an object. ________________

   ____

6. Of the six standard views of an object, which views show the depth?

   ____

7. List three ways or methods of transferring dimensions from the top view to the side view. ______________________________

   ____

8. Which one of the three methods in problem 7 is considered best when using the drafting machine? ________________ Why? ____________

   ____

EXAMPLE

9. A view may not need to be complete but may show only what is necessary in the clear description of the object. Such a view is called a ______________________________.

10. When making partial views, is it always necessary to show all visible and invisible lines? ______________________________.

11. Suppose that the front view of a circular object has several holes spaced around a common circle. It is necessary to show hidden lines for each hole in the side view? ______________________________

12. Are ribs and arms always shown in their true position? ______________
Why? ______________________________

13. What is a removed view? ______________________________
____
____

14. What is a normal surface? ______________________________
____

15. What is a normal edge? ______________________________
____

16. What is an incline surface? ______________________________
____

17. What is an inclined edge? ______________________________
____

18. A surface that appears foreshortened in all three views is called an ______________________________ surface.

19. In which view does an oblique line appear true length? ______________

EXAMPLE

20. If an angle appears on a normal surface, does it appear true size on the plans of projection? ________________________________

21. Why are rounded surfaces common in engineering practice? __________
____

22. If a cylinder is cut by an inclined plane, the inclined surface is bounded by an ____.

23. Should a line be drawn where a curved surface is tangent to a plane surface? ____

24. In general, what is it that notes tell a machine operator? ______
____

25. What is a "blind" hole? ____________________________________
____

26. Which triangle do draftsmen usually use to draw drill points? _____

27. A rounded interior corner is called a ________________________.

28. A rounded outside corner is called a _________________________.

29. Why are sharp corners avoided in designing parts to be cast or forged?
____

30. On a drawing, a rounded corner means that both intersecting surfaces are ____.

31. How should radii less than 1/8" be drawn? ____________________

32. What is a "runout?" ____

33. If you are given a drawing of a right-hand part, how might you convert it to a left hand part? ______________________________
____
____